

THE IRON AGE

Established 1855

New York, March 6, 1913

Vol. 91: No. 10

Factory Building Equipment Details

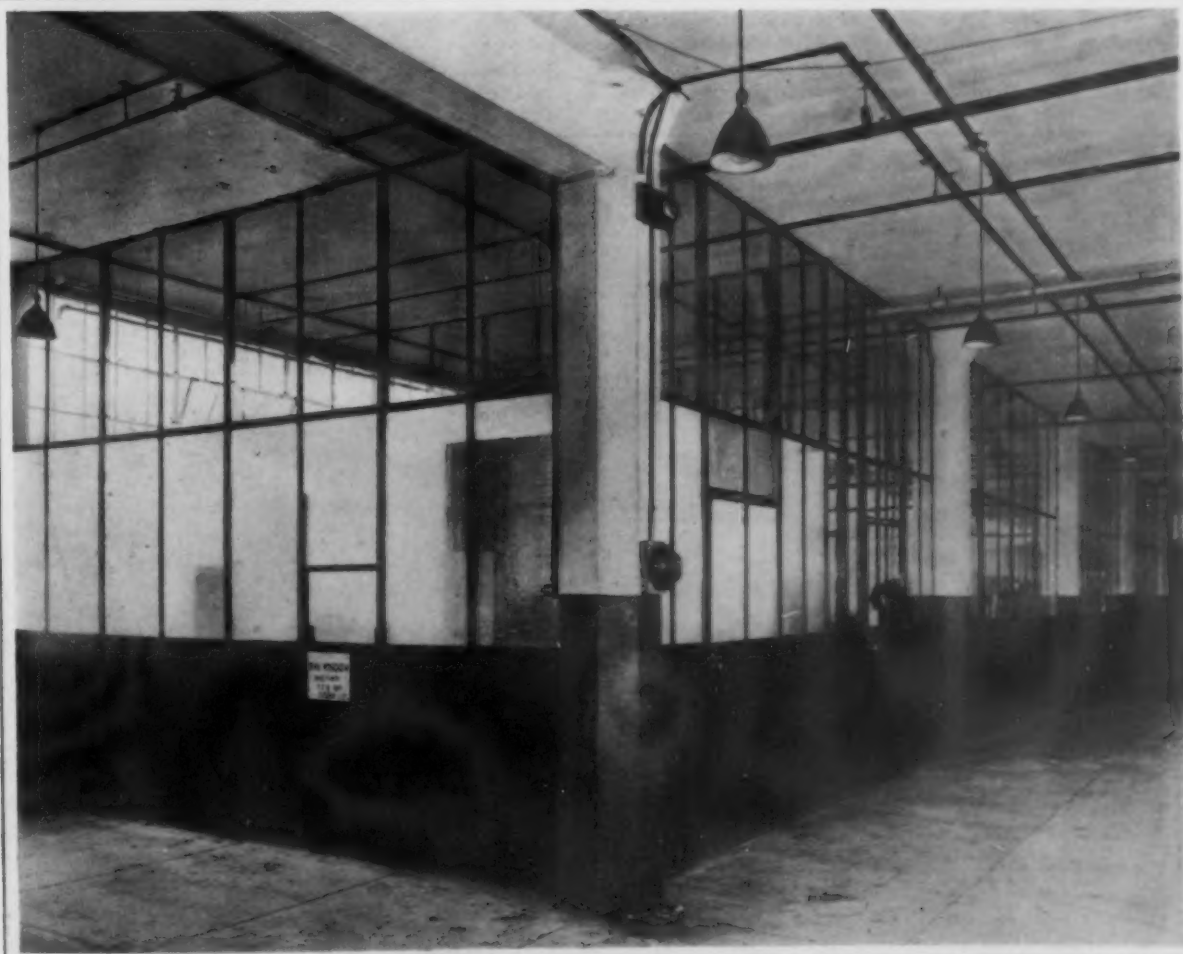
Partitions, Storage Racks, Work Benches and
Other Points of Wide Application in Plant
of Continental Motor Mfg. Company, Detroit

BY HARRY C. SPILLMAN

Within the last ten years a new era has started in all lines of manufacturing and the growing concerns of to-day have as a rule realized that the proper routing of material is a large saving in production, and a factory layout which will allow any department to expand without rearrangement or moving of other departments and also suitable buildings for the work which is to be housed are some of the problems which need good foresight. This calls for architects and construction engineers of a high caliber, so when the plant is completed and turned over to the owners it will be satisfactory in construction, layout and equipment, and will meet every requirement for their manufacturing problems, so far as can be anticipated.

Manufacturers have discovered that architectural beauty is an asset and advertising feature which it is difficult to measure as to its real value, and until very recently it was given very little consideration. The first impression is generally a lasting one, and for this reason alone an attractive factory is an excellent advertisement. The use of a few pressed brick and a small amount of cement or stone work on a building will easily change an unsightly building into one which is attractive, the additional cost being generally very slight compared with the results obtained.

After the preceding questions have been partly solved the next important problem is whether to use mill con-



Movable Metal and Glass Partitions with Light Angle and Flat Bar Framework

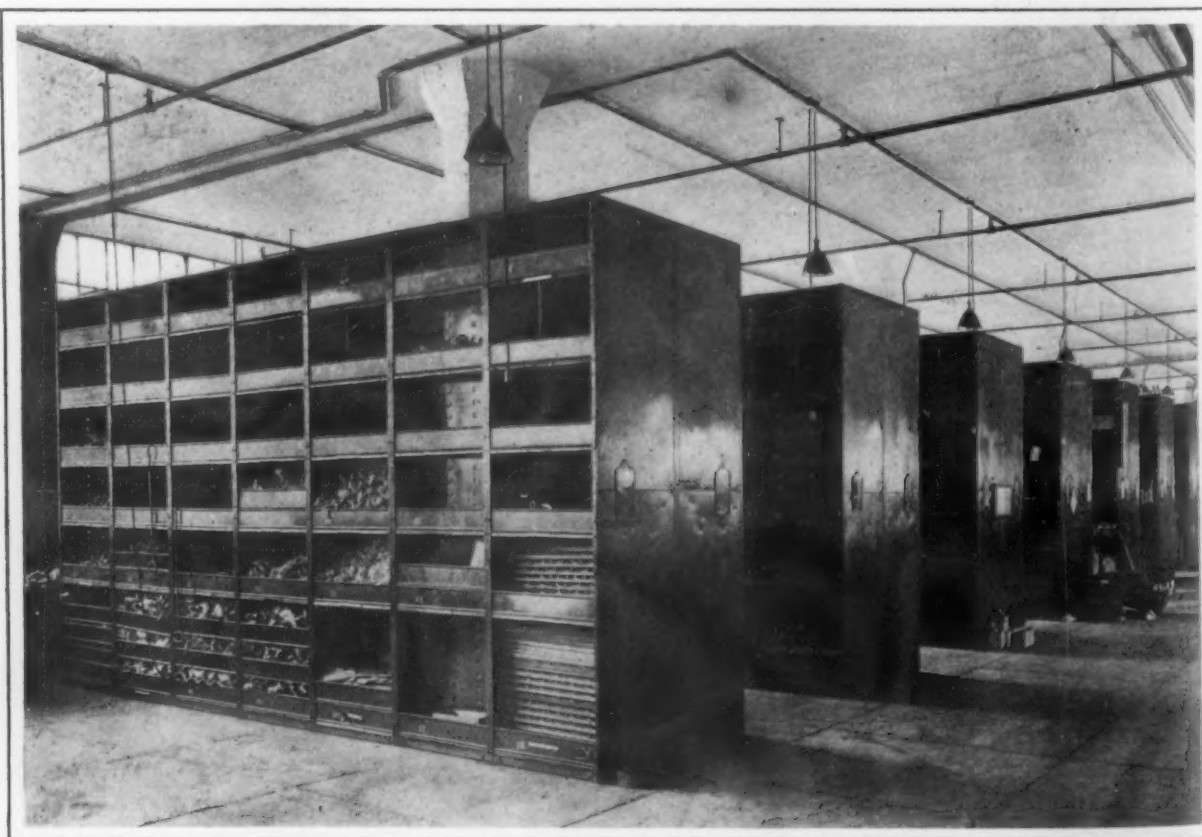


Style of Partitions Used for the Tool Room

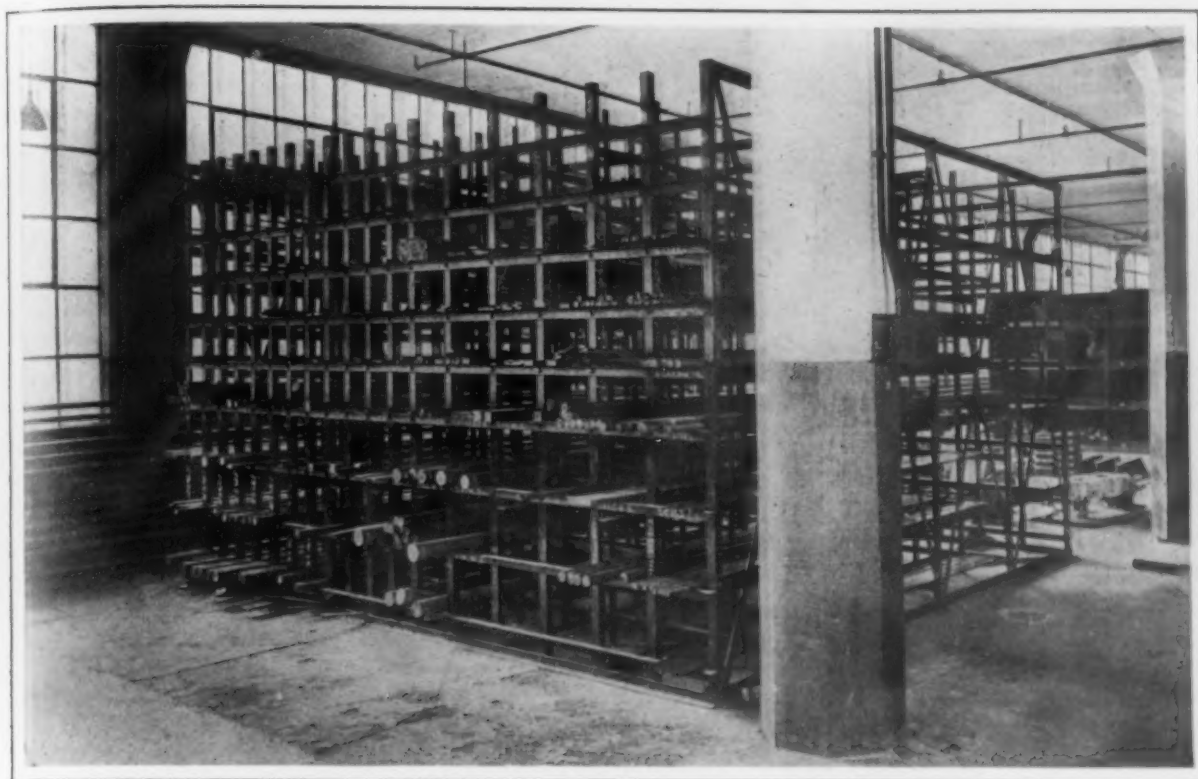
struction, steel or reinforced concrete or a combination of these. The advantages of the reinforced concrete building are many, and it would do no harm to mention a few of the desirable features. About the most important is low depreciation, as a concrete building will become stronger and more durable with age while a mill type will gradually deteriorate, which makes the up-keep and maintenance charge of a concrete building very low. Another great advantage is the fireproof qualities which greatly reduce the insurance rate and still another is its sanitary features. The great weight of the concrete allows machinery to be

placed on the upper floors and the vibration is absorbed by the mass in the building. These features alone are well worth consideration, besides fires of intense heat in a concrete building can do little or no damage. Structural steel works out far better than reinforced concrete for buildings of only one floor, without interior columns, and of considerable height to the roof trusses. This class of buildings includes foundries, erecting floors, saw tooth machine shops, etc.

The Continental Motor Mfg. Company's building will be taken for an example, as it is a model factory which



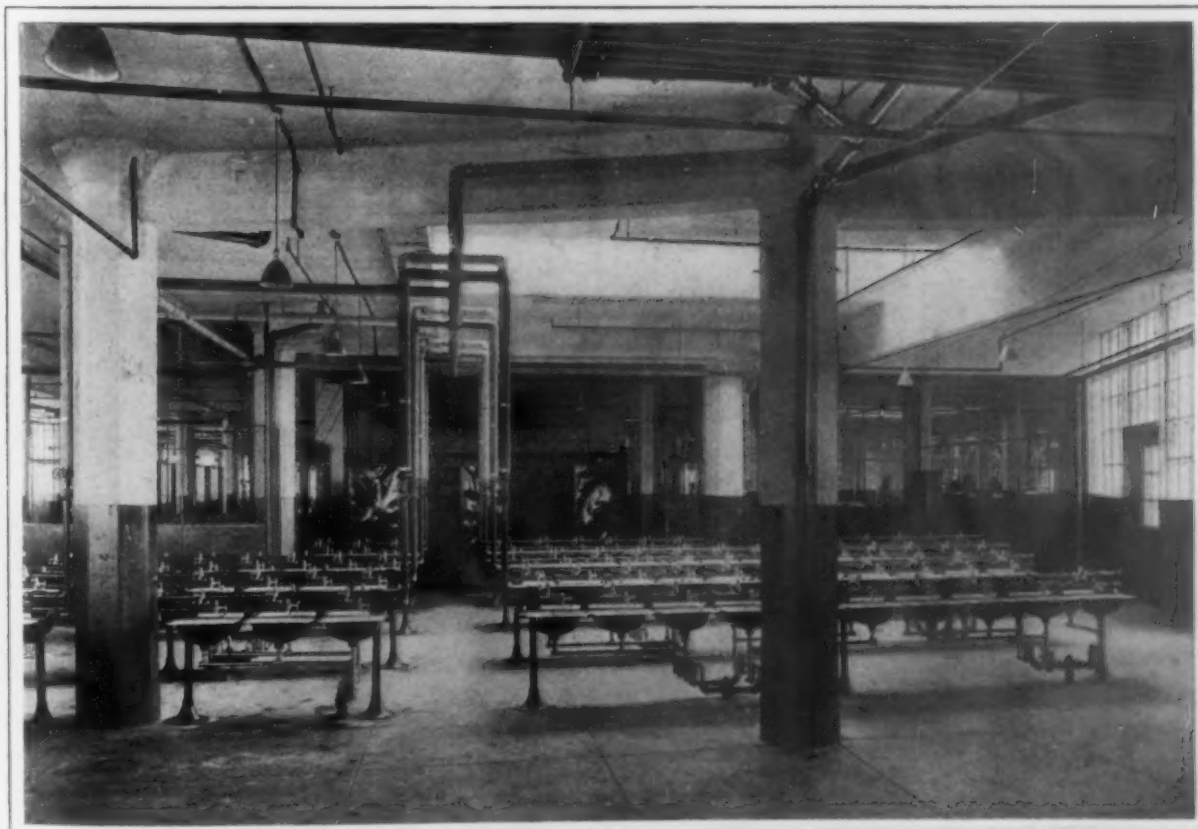
Black Enameled Adjustable Metal Racks for Storing Stock



Rack for Bar Stock Made of 2-in. Angles Enameled Black

has just been completed, and is attracting attention from many sources for its architectural beauty, careful planning and advanced ideas in equipment. The main assembly rooms and stock rooms are of reinforced concrete construction. The machine shop, test room and heat treat room and power house are of structural steel. In the reinforced concrete portion of the factory the flat slab construction was used to eliminate all concrete beams and girders. This does away with obstructions to shafting, piping, wires and other equipment suspended from the ceiling, besides helping the impression of loftiness.

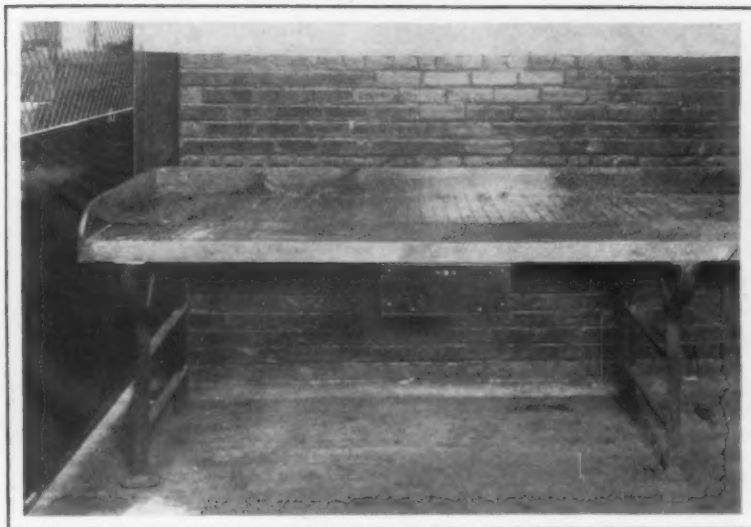
In order to decrease the insurance further and add to its fireproof qualities, steel sash are used throughout the entire plant. These sash have swinging windows hung near the top in order that they will not interfere with curtains. They take up the entire opening between the building columns to obtain the maximum amount of light. This is still further increased by using ribbed glass, the ribs running vertically. The great advantage of steel sash is 30 per cent. increase in glass area, less depreciation and the addition of another fireproof item to factory buildings. The sash used in this building are Fenestra steel sash,



The Batteries of Individual Wash Bowls Supplied with Hot and Cold Water

manufactured by the Detroit Steel Products Company. The general effect is shown.

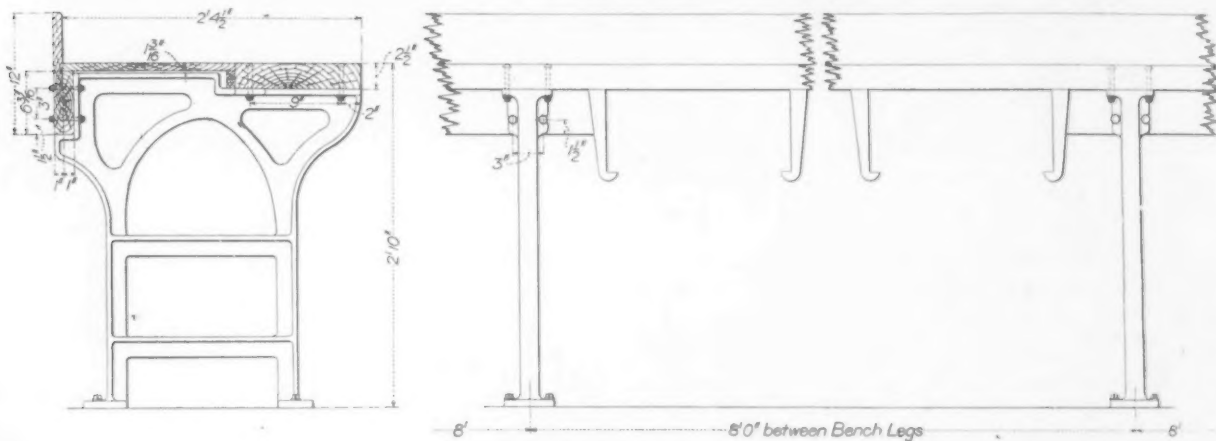
About the most troublesome feature of a factory is its doors, which continually need repairing. A sliding door partly solves this problem, but it gives more or less trouble, and it is almost impossible to make them weather tight. For all around use swing doors work out the best, and they generally swing out, which



View of the Type of Work Bench Used

the iron frame and extending two-thirds way across the door and bolted to the door with $\frac{5}{8}$ -in. machine bolts.

The door itself is $2\frac{3}{4}$ in. thick, reinforced with metal angle strips at the corners and having a heavy kick-plate made out of No. 12 gauge iron, 4 ft. high. The hardware used is Brewers' heavy wrought-iron latches, which are strong and durable, and the locks consist of a heavy,



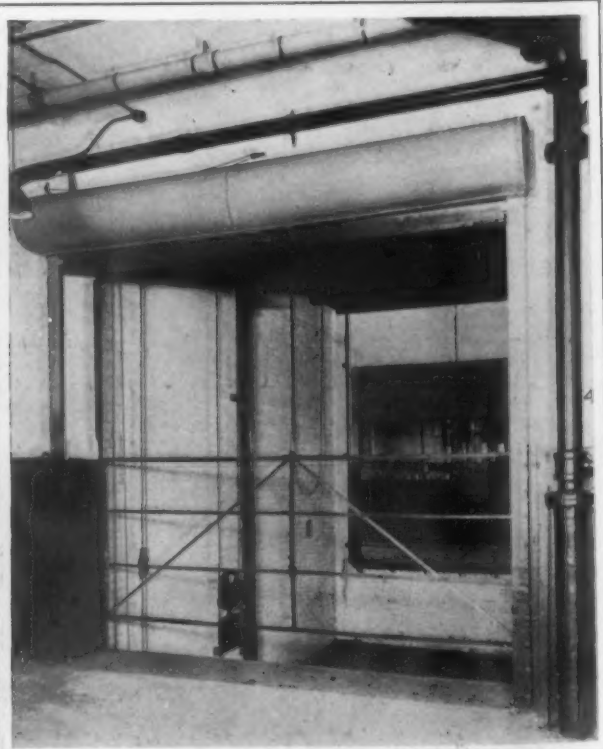
Structural Details of the Work Bench

allows an easy exit in case of fire and material placed near these doors will not interfere with opening them. The frames are made of angle iron with iron stops riveted to them. The hinges are of wrought iron well riveted to

dead bolt. The doors have stood up under the severe service which factory doors generally receive. The interior doors are made under the same general specifications, excepting that they meet the fire underwriters' requirements by being



The Type of Door Construction



Wire Mesh Gate and Fusible Link Curtain to Elevator

nixed and that smaller size hinges are used. The locking system was carefully thought out, and the Russell Irwin system was adopted, with special keywaying in order to make it impossible to purchase blank keys. Each department has its own master keying system and a grand master key opens every lock. Each department has its own padlocks, which are under the same master keying system as the building, which allows an officer of the company or a watchman free access to every lock and padlock with the use of only one master key.

The stairways are inclosed by a brick partition and reinforced concrete stairs are installed with safety treads. A railing made out of 2-in. pipe and well secured to the concrete work makes a strong and durable stairway.

Great care was taken in selecting the fixtures, special attention being given to durability and sanitation. The drinking fountains are the Purita, manufactured by the J. L. Mott Iron Works, and they have a self-closing regulating valve and also a loose-key stop valve. Each fountain is connected to a Smith Common Sense water cooler, which consists of a piece of 6-in. pipe 30 ft. long, cupped at each end and placed vertically in the ground near the



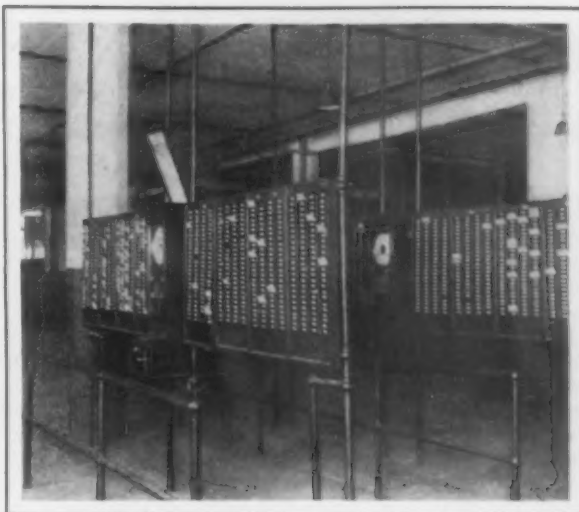
Brick Enclosed Concrete Stairway with Pipe Railings

fountain. The water enters near the top of the pipe and is drawn off at the bottom. This allows the pipe to keep full of water under city pressure and, being surrounded by the cool earth, lowers the temperature, about the same as cold well water. This makes an inexpensive and effective way of cooling drinking water in summer and does not need any attention whatever.

After careful comparison of the different makes of wash stands, the shop individual wash bowl, manufactured by the Manufacturing Equipment & Engineering Company, was decided upon. These wash bowls are neat and attractive, require very little attention to keep clean and stand up under hard usage.

One of the big items of maintenance in factories is the closets, and in order to reduce this expense the low down syphon-jet water closet was adopted with aluminum seats. Slate partitions are used for the closets made out of 1½-in. black slate, and 5 ft. 6 in. high and set up 10 in. from the floor on neat pipe standards.

Another item which is a continual source of trouble around a plant is a wooden elevator gate. A gate made out of light angle iron does away with this trouble. Steel cable is used instead of rope, and the gate is covered with wire screen having a 1-in. mesh. This protects any one from placing his arms and head through the openings. In order to protect the elevator shaft in case of fire



Pipe Railing for Aisles to and Supports of Time Clocks

a metal rolling curtain is installed over each opening and held open by means of a fusible link.

The work benches in the plant appeal to a factory man, as they are supported on metal legs placed in 8-ft. centers. The front of the benches is made of 3 x 12-in. maple, and back of this is laid short pieces of maple flooring, one edge of which is nailed to the 3 x 12-in. maple by means of a cleat, and the rear nailed to a 2 x 6-in. stringer, which is bolted to the bench legs. The back has a 1 x 6-in. strip which keeps the parts from rolling off. All the woodwork is given a good coat of shellac, which adds to the appearance and protects the woodwork. Between each set of legs is installed a metal workbench drawer with trays, and a lock which is master keyed. The bench legs are made with two cross braces, which can be used to support shelving underneath the benches in case it is ever desired.

The time clocks are supported on a frame work made of 1½-inch pipe with pipe railing fittings. The pipe is well anchored to the floors and ceilings, which make a very rigid framework for supporting time clocks. Aisles, of pipe railing, are also made between the clocks to avoid a congestion of men at the time clocks.

All the stock is stored in metal racks having adjustable shelves and partitions. These racks are designed so that they will stand 400 lb. load per square foot of shelf area. The steel bar rack is made of 2-in. angle iron which makes a very strong rack. All the racks are enameled black, and give the stock room a neat appearance. A metal bin has many advantages over the wooden bin, but the most noticeable one is its flexibility as the compartments can be adjusted to any size desired, and changes can be made in a very few minutes.

A metal glass partition for factory offices is a new introduction which has worked out satisfactorily. These partitions are made out of small angle iron with a No. 12 gauge metal wainscoting about 4 ft. high. The angle iron frame is partitioned off above the metal work for the glass. These partitions are made in sections 4 ft. wide and a ¼ x 4-in. stiffening bar is placed vertically between each section and runs from the floor to the ceiling. This makes the partition very stiff and substantial. The glass is bedded in putty and carefully back puttied along the edges of the angle iron. This style of partition is very inexpensive and easily moved.

The tool crib partitions are similar in design except that woven wire is used instead of glass, and they are reinforced, having 2-in. iron pipe at all the corners and door openings, which increases the rigidity of the partitions and protects them at the weak points.

The receiving room is equipped with a new Springfield automatic scale with an instantaneous reading dial graduated to ¼ lb. The platform is made flush with the floor so that the material can be weighed without unloading from the factory trucks.

The day watchman makes a thorough inspection of the entire plant each day, and reports any repairs that are necessary. This keeps the equipment in order and cannot help but increase production in many ways.

Factory "Red Tape" as a Life-Line

How the Man from the Outside Can Aid in Finding the One Best Way— Recognition of the Human Factor

—BY STERLING H. BUNNELL—

It is now some six years since a leading engineer presented a paper before one of the national engineering societies, in which he advised employing more foremen in factories to insure doing the work in the best and quickest way. Instead of leaving the workmen to do what they could, or would, with whatever equipment happened to be at hand, the management would ascertain in advance what was needed, place everything in readiness and then show the workman just how to proceed. In this way there would be no under-production, for each job would be done by an exact set of rules, at the greatest possible speed. It seems strange to-day to recall that when the speaker finished there was a chorus of protests. Foremen, said one engineer, are non-producers, a mere item of expense; to increase foremen as a means of decreasing cost would be absurd. The American workman, said another speaker, is the most intelligent in the world. How can we presume to tell him how to do his work? Suppose, said a third, that after you have ascertained the best way to do a job, the workman should find a better way; would not that be very awkward? And so various speakers joined in the chorus of dissent, never dreaming that they had been listening to the first exposition of principles of the new science of management, which was shortly to engage the serious consideration of the industrial world.

Not long after this paper was read and condemned the president of a large manufacturing corporation stated that the Taylor system in his works had virtually given him the output of four shops in the place of one. With the same buildings and the same labor cost, the output had been increased fourfold. Since then the various apostles of the system have extended their methods into other shops with similar success. The results of their work, as published from time to time, have shown such remarkable gains in production that manufacturers everywhere have become interested.

It seems to some incredible that outsiders can produce in a factory results so far beyond those previously obtained by the employees most familiar with the business. The doubters say that "bookkeeping makes no money"; red tape causes delay and expense. How then, can increase in output be secured otherwise than by the good old method of prodding the workers? Scientific management, however, is neither a system of bookkeeping, nor a set of rules, nor a piece work plan, though it sometimes adopts all three.

Finding the One Best Way

Looking backward from present day knowledge, we recall with surprise that manufacturers were once content to urge their men to speeds without first ascertaining the best and quickest method. It is not long since each workman ground his drills, forged his tools and ran his machines at the rate that first occurred to him as suitable. No man knew whether his work could be done faster or better, because he was expected to go ahead with his task and not stop to try experiments. This general practice overlooked the fact that some men are better planners, while others can only carry out the plans given them; and there was no definite system to take the place of the practice of individual guessing at the best way to tackle the job. With the invention of high speed steel-cutting tools and the construction of heavier machines to utilize them, the old methods of work became intolerably inefficient. The customs of the mechanic's trade became hopelessly incorrect, and the gaps between individual workmen began to widen. As large, new tools seemed too expensive to be run at slow speeds by young men learning the trade the thrifty manufacturer took no more apprentices, with the natural result that thoroughly trained mechanics became scarce. Standards of living increased and the native handy-man found helper's pay unattractive and went into other fields. Foreign laborers were ready to

take the places, but the overworked foremen had no time to teach them. As the result of these various conditions the new powerful machine tools brought out to utilize high speed steel were often operated far below capacity. The losses by failure to take advantage of tool capacities became so obviously serious that the way was cleared for the men who formulated the principles of the new system, by which one set of workers should ascertain the one best way to each job, and another set should perform the work accordingly. The system was most naturally called what it is—"scientific management." It has one obvious fundamental principle: first find the way, then follow it; or in familiar language, "Be sure you are right, then go ahead."

Red tape, typifying system, has now become the life-line to pull the manufacturer out of the slough of inefficiency. There is always one best way, and, to produce the best results, this way must be exactly followed. Deviation from the right way must be into a wrong way; from the best method, into one not as good. In either case the result is loss of possible profits. It is not enough to try in a general way to locate some of the losses in the manufacturing plant. The greatest success can be obtained only by investigating the whole method of operation and establishing an exact system by which every detail of the work shall be performed in the most effective way.

Value of the Detached Investigator's Advice

The investigation of working conditions can be successfully made only by workers completely detached from the productive routine. The most impossible task that can be set for any man is to study and judge himself and his own methods. The outsider can hardly fail to be a more observing critic than the man who is surrounded by the details of the factory operation. The manager's proper function is to receive cordially and apply effectively the suggestions coming from the adviser's outside point of view.

Often active, profit-making organizations, being busy with the daily routine of carrying out orders, overlook astonishing losses which some chance observer outside the daily drive sees at a glance. In a large shipyard, the dock crane was in charge of one department, while certain workmen employed on a ship under repairs belonged to another department. When these men had detached a heavy piece of machinery, they sent for the crane to lift it. The crane users, however, were busy and failed to respond promptly. Whereupon the repair gang sat down comfortably on the job and for six days reported in and out at the usual hours, doing no work whatever, but sure of drawing their pay just the same. Another scene in the same shipyard: A balky horse, an angry teamster, a broken whip and a handy barrel of bolts resting among other barrels in an open shed close by. Some well-aimed bolts thrown at the horse started the load on its way at a cost of \$2.60, as figured by a clerk who watched the proceedings, but did not take the trouble to pick up the bolts. The scientific analysis of conditions should start at the bottom and go completely through the factory methods. It must determine what each man and machine can do under the best conditions and establish conditions and results as standards. In order to maintain the standards of work, causes of delay are to be observed and investigated and steps taken to avoid them. If, for instance, Bill takes three hours longer than standard time on a job, the fault is to be traced to its source; this may be found in some purchase of cheaper tool steel by some mistaken economist. Just such improper things do happen in shops; indeed, they happen repeatedly. Again, too large a proportion of tools seems to be idle at certain times. Investigation discovers \$3 men walking a hundred yards to a badly placed tool room, and perhaps waiting in line for a single attendant to serve them. The planner accordingly provides for sending the

proper tools to each machine in advance of the job. Idle machinery is a necessary consequence of accidents and illness of workmen; wherefore, a safe and healthful shop is a source of profit. The final result of the investigation of conditions and methods is a set of standardized operations by which every factory job is done in the best and quickest way and failures to reach the standards are almost eliminated.

The Human Factor Recognized

The human side of the management problem must not be overlooked. Contrary to the beliefs of opponents of exact systematic methods, the human factor has always been recognized by the pioneers of scientific management. Taylor, having studied his machines until he learned how they should be run to the best advantage, paid higher rates to the workmen who followed his instructions exactly. Gantt provided simple diagrams, so that even unthinking men could see at a glance what work could be done, and what they themselves were doing day by day; and he paid each man a bonus for reaching the standard output and gave another bonus to the foreman who managed his department so that his men could earn their rewards.

Stimpson measured the work done by the laborer, in standard units of foot-pounds and set a task suited to the known physical strength of the human organism. Emerson, perhaps the first to use the "efficiency" standard to measure factory work, went over the ground work of the relation between employer and employee and laid down fundamental principles of scientific management for the benefit of both. And Gilbreth revolutionized trade records by devising arrangements to make habitual trade motions unnecessary and by teaching the workmen to put their muscular efforts into effective movements only. The same ingenious developer of scientific methods is now reported to be adapting the popular "movie" to the purposes of scientific management so that trade workers can see themselves in the act of making their unnecessary motions and compare their ways with those of well-taught operators who do more effective work with less bodily fatigue. Running through the work of all these men is the line of red tape—exact adherence to the system. The human factors must be considered, not by slackening or cutting the life-line, but by making its use easy and desirable.

Scientific management has come to stay. The efficiency standard in manufacturing will be as generally understood and used as it has been in steam engineering. Manufacturers will no longer be content to let each worker find his own tools and adopt his own unstudied methods. The planning of all factory work, down to the smallest detail, will become the accepted practice. The provision of a trained force of selected workers; comfortable and healthful shop conditions and subdivision of tasks so that each man may do the thing for which he is best fitted, will be the ideal of the competent manager. But the ideal will be realized only by the liberal provision of rules and standards of effective work and red tape enough to hold the men to those standards.

The Sloss-Sheffield Company's Year.—President J. C. Maben, of the Sloss-Sheffield Steel & Iron Company, interviewed at New York concerning the Southern iron market, reported a recent sale of 15,000 tons by his company, but referred to the market generally as dull with prices showing a tendency to go lower. The sale mentioned is understood to have been to a cast-iron pipe company. The annual report of the company for the year ending November 30 shows earnings of about 2 per cent. on the common stock as against a deficit of \$64,351 in the previous year after paying preferred dividends. The outlay for improvements this year is put at \$500,000; that of last year was \$240,000.

Removing Ruins with the Oxy-Acetylene Torch

Early in the evening of January 2 fire broke out in one of the buildings of the Carnegie Steel Company's Baltimore plant. After about three hours, the structure which measured approximately 300 x 130 ft. and was of the steel frame type covered with galvanized-iron siding and a composition roof was totally destroyed. After the fire was extinguished the entire area covered by the building was a mass of buckled iron and steel twisted into various shapes. While, of course, the sections were of numerous different sizes, the majority of it was 10-in. I-beams.

It was necessary to remove this mass of material as rapidly as possible in order that the burnt building might be replaced by a new structure, and on account of the twisted condition of the steelwork it had to be cut into lengths capable of being handled easily and hauled away. For doing this work a No. 3-T plant was furnished by the Alexander Milburn Company, 1420 West Baltimore street, Baltimore, Md. Being mounted on a truck, it was possible to wheel this plant from place to place as the conditions of the work required and a comparatively long radius of action was secured by using a 50-ft. length of hose. While,



Removing Structural Steelwork Ruined by Fire with the Oxy-Acetylene Cutting Apparatus Made by the Alexander Milburn Company, Baltimore, Md.

of course, it was possible to use several torches with this outfit, at the same time on account of the condition of the steelwork only one operator and a helper with a single torch was used. This outfit, it is stated, cut the iron and steel into movable lengths faster than a force of five men could load it on trucks and carry it away, the total time required being approximately 90 hr.

The Fore River Shipbuilding Company, Quincy, Mass., has issued its annual report for the year ended December 31, 1912. Contracts now in hand will employ the present force about 18 months. The following statement is made: "The company received a contract from the United States Government early in 1912 for the construction of the battleship Nevada, which contract provides that it is to be built in a yard which has established an eight-hour work day. On account of this and other naval work it became necessary to place the entire plant on an eight-hour day on November 4, 1912. This step, together with considerable unrest among employees and most serious delays in receipt of important materials by subcontractors, has resulted in a decrease in the surplus during the past year of \$281,000."

The Carnegie Steel Company is building a slag crushing plant on the site of the proposed McDonald mills between Girard and Niles, Ohio. Slag from the blast furnaces and steel plants at the Ohio Works, Youngstown, will be hauled to the site over the Youngstown Northern Railroad to be crushed into various forms as desired for ballast, road construction or reinforced work.

An Increasing Number of Car Wheel Failures

The Records of Accidents from Equipment Defects Show Broken Wheel Flanges To Be the Principal Cause—A Comparison with Rail Failures

The tables containing the twenty-sixth annual report of the Interstate Commerce Commission, covering the year ending June 30, 1912, give for the first time official information on the subject of derailments due to defects of equipment over a period sufficiently long to admit of comparisons and conclusions. Extracts from these tables given herewith show that the particular equipment defects to which wrecks and accidents are attributed play a much smaller part in the total record, and others of which little is heard a much more important part than the railroads and the general public have been led to suppose.

In 1912, for instance, 1084 derailments out of a total of 3847 caused by defective equipment were due to broken wheels and broken wheel flanges, 627 of the number being due to broken flanges. The Commerce Commission report says (page 52): "The larger number of derailments in the class reported under defects of equipment was due to broken flanges, there being 627 from that cause out of a total of 3847" (the latter total including all derailments due to defects of equipment for the year 1912). Derailments caused by broken rails in 1912 as given in the same report (page 56) numbered 363—about one-third of the number due to broken wheels and wheel flanges and about one-half of the number due to the single item of broken wheel flanges. The actual number of broken wheels and rails was far greater than the totals thus given because no breakages are reported unless accidents follow.

As may be seen by the tables quoted the number of derailments caused by broken flanges in the first three years of the 11-year period—1902, 1903 and 1904—was 1070, and the number due to the same cause in the last three years—1910, 1911 and 1912—was 1827, an increase of 70 per cent. The total cost of damage to road and equipment and cost of clearing wrecks in the full period, that were

733,620. This cost does not include damages for the killed and injured or the loss resulting from interruption of traffic.

The total number of derailments due to all defects of track and equipment from 1902 to 1912 inclusive is given at 28,904; of this total the number due to wheel breakage was 2520 and to flange breakage 6020, the two together making 8540, or nearly one-third of the entire total, and the total damage due to the 8540 wheel failures was, as stated, \$8,733,620 out of a grand total of damages due to all defects of track and equipment of \$23,359,116.

Table 1.—Derailments Due to Defects of Equipment, 11 Years Ended June 30, 1912.*

Year.	Number of Accidents.	Killed.	Injured.	Damage to Road and Equipment and Cost of Clearing Wreck.
1902	1,609	25	396	\$1,295,299
1903	1,841	24	414	1,502,325
1904	2,297	60	630	1,953,392
1905	2,605	40	798	2,068,620
1906	2,811	42	802	2,226,153
1907	3,178	59	926	2,490,028
1908	2,796	37	831	2,176,194
1909	2,362	28	631	1,875,646
1910	2,734	40	636	2,227,352
1911	2,824	64	698	2,379,074
1912	3,847	68	1,197	3,165,033
Total	28,904	487	7,959	\$23,359,116

*Figures for number of persons killed and injured for years prior to 1911 are restricted to passengers and employees on duty.

The number of persons killed in derailments caused by wheel failures in the 11 years was 117 and the number injured was 1323—out of a total of 487 killed and 7950 injured in the same period through all derailments due to defects of track and equipment. These figures show that

Table 2.—Derailments Due to Defects of Equipment, 11 Years Ended June 30, 1912*

Broken or Burst Wheels					Broken Wheel Flange				
	Number of Accidents.	Killed.	Injured.	Damage to Road and Equipment and Cost of Clearing Wrecks.	Number of Accidents.	Killed.	Injured.	Damage to Road and Equipment and Cost of Clearing Wrecks.	
1902	172	4	43	\$189,953	290	1	37	\$289,091	
1903	162	3	20	165,735	387	3	52	408,984	
1904	240	9	51	271,298	493	11	73	555,453	
1905	235	6	88	337,999	581	2	94	507,432	
1906	182	1	23	212,803	649	12	135	543,773	
1907	242	8	73	264,692	693	9	107	675,134	
1908	234	..	41	270,097	582	7	94	614,967	
1909	220	..	15	246,286	518	6	73	497,712	
1910	241	4	19	256,074	619	3	88	583,972	
1911	235	6	34	281,985	581	11	72	582,360	
1912	357	3	27	371,938	627	8	64	605,882	
Total	2,520	44	434	\$2,868,860	6,020	73	889	\$5,864,760	

*Figures for number of persons killed and injured for years prior to 1911 are restricted to passengers and employees on duty.

Table 3.—Derailments Due to Defects of Equipment.

Year ended June 30, 1912.					Year ended June 30, 1911.				
Cause of Accident.	No. acci-dents.	Killed.	Injured.	Damage to road and equipment and cost of clearing wrecks.	No. acci-dents.	Killed.	Injured.	Damage to road and equipment and cost of clearing wrecks.	
Defective wheels—									
Broken or burst wheel.....	357	3	27	\$371,938	235	6	34	\$281,985	
Broken flange	627	8	64	605,882	581	11	72	582,360	
Loose wheel	124	2	20	97,671	103	..	28	89,073	
Miscellaneous	127	2	169	109,413	78	1	43	55,047	
Broken or defective axle or journal..	410	2	104	302,146	355	9	88	310,782	
Broken or defective brake rigging....	528	4	157	411,294	382	9	131	289,968	
Broken or defective draft gear.....	177	6	48	110,456	131	2	29	77,572	
Broken or defective side bearings....	177	1	94	125,785	79	4	39	66,595	
Broken arch bar	257	8	130	275,828	119	1	7	136,370	
Rigid trucks	184	2	66	124,979	55	1	30	40,315	
Failure of power-brake apparatus, hose, etc.	216	5	29	107,203	168	1	28	78,078	
Failure of couplers.....	208	2	30	98,892	185	..	27	94,264	
Miscellaneous	455	23	259	423,546	353	19	133	276,665	
Total	3,847	68	1,197	\$3,165,033	2,824	64	689	\$2,379,074	

due solely to broken flanges, was \$5,864,760, and the cost due to wheels otherwise broken was \$2,868,860, making the cost of derailments due to such wheel failures alone, \$8,-

wheel failures have first place in the list of causes of derailments and that broken wheel flanges are the leading item in the list of wheel defects.

Table 1.—Derailments Due to Broken Rails for 11 Years Ended June 30, 1912.*

Year	Number.	Killed.	Injured	Damage.
1902	78	5	207	\$128,769
1903	150	12	204	166,140
1904	176	9	139	157,682
1905	201	4	465	257,519
1906	220	7	635	254,862
1907	308	12	699	284,675
1908	238	16	433	296,327
1909	196	5	498	191,842
1910	243	24	369	293,899
1911	249	12	463	292,749
1912	363	52	1,065	511,778
Total	2,422	158	5,177	\$2,836,242

*Figures for number of persons killed and injured for years prior to 1911 are restricted to passengers and employees on duty.

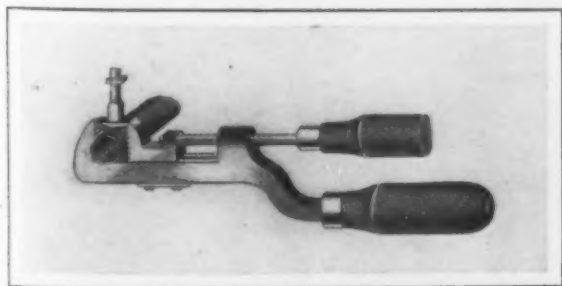
A great deal has been written about the responsibility for present conditions of chilled wheel service, but the figures cited would indicate that the gravity of the situation has not been appreciated. Railroad engineers and rail makers have not taken the position, in discussing the betterment of rails, that it was "the concern of makers," as viewed from the engineer's standpoint, or "the concern of the user," as viewed from the maker's standpoint. Had this been their attitude little betterment would have resulted. But this has been the situation of the wheel question for years. The figures given in the 1912 report of the Commerce Commission again bring the subject into daylight.

One of the difficulties of chilled wheel manufacture is the low cost of the plant necessary to make such wheels and the ability of any one to build and equip a plant in a few months' time. In the opinion of some connected with the business this has conduced more than anything else to the low price at which such wheels have been sold. Be this as it may, the necessity of bringing the quality of the chilled wheel to a proper basis is emphasized today as it has never been. The familiar fact that wheel loads have greatly increased is given in explanation of the increase in wheel failures. But explanation is not the thing called for. Regardless of any opinions held by wheel makers or railroad officials as to reasons for the conditions of wheel manufacture and wheel service that have produced the results shown, the makers and the users should get together as the rail makers and railroads have done and try to find means of improving the quality of car wheels to make them equal to present service conditions.

Screw Wrench for Pipe and Round Head Bolts

To hold a round headed bolt and keep it from turning while tightening or slackening the nut the Standish Tool Works, Sebago Lake, Maine, has brought out a new wrench, which is known as the Nonpareil screw wrench. In addition to holding round headed bolts, this wrench will, it is claimed, also do the work of a pipe wrench or tongs and can also be used as a hand vise or clamp for holding parts while drilling or filing.

This wrench was invented by a carriage and wagon maker and repairer to overcome the difficulties encountered in his work, as round headed bolts are used almost exclusively in this class of construction. The tool which, it is emphasized, is really a combination of four tools in one, since it will also do all the work of an ordinary monkey



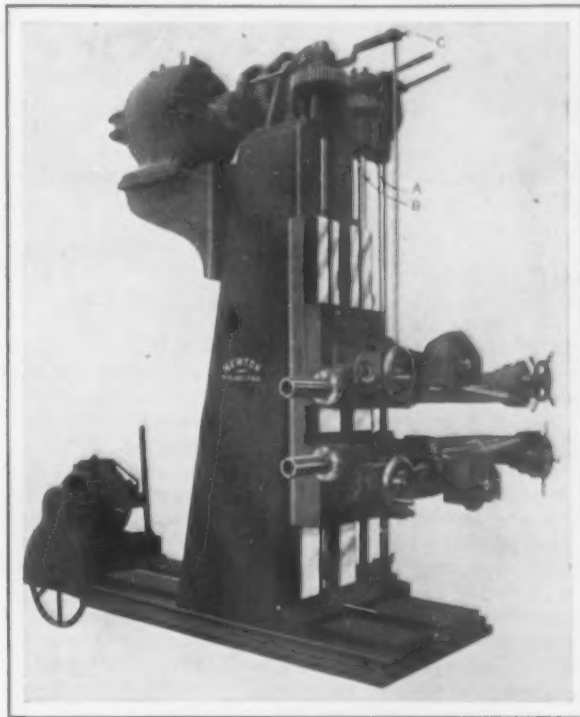
The Nonpareil Screw Wrench for Round Headed Bolts, Pipes, Nuts, Etc. Made by the Standish Tool Works, Sebago Lake, Maine

wrench as well as that of the ones previously mentioned, is made of crucible steel castings, containing titanium alloy. It is hardened and tempered to give it long life under severe conditions.

Portable Boring, Drilling and Milling Machine

A Double-Spindle machine with a Constant Distance between Spindle Centers

For drilling any number of holes at different heights and still maintaining the original center distance between the spindles, the Newton Machine & Tools Works, Inc., Twenty-fourth and Vine streets, Philadelphia, Pa., has redesigned one of its portable double-spindle, horizontal boring, drilling and milling machines. It will be noticed from the accompanying engraving that the bottom spindle revolves in bronze bushed capped bearings on the main saddle and the top spindle is mounted on an auxiliary



A Recently Redesigned Type of Double-Spindle Horizontal Portable Boring, Drilling and Milling Machine Built by the Newton Machine Tool Works, Inc., Philadelphia, Pa.

slide, which has adjustment on the main saddle, in order that the desired distance between the centers of the spindles can be obtained and the main saddle raised or lowered. One of the special fields for which the machine is designed is the drilling of holes in electric motor and generator frames, etc.

The spindles, which are $3\frac{1}{2}$ in. in diameter, are driven by steep lead worms and worm wheels, the former being of bronze and the latter of hardened steel. The drive to each spindle is entirely independent of the other, and there are quick and slow adjustments, the latter by hand, as well as three changes of geared feed, ranging from 0.0045 to 0.0124 in. per revolution of the spindle. The spindles are fitted with a No. 4 Morse taper with retaining and drift key slots and operate at speeds ranging from 88 to 150 r.p.m. Each spindle has a feed and hand adjustment of 30 in. and the distance between their centers can be varied from $6\frac{1}{2}$ to 30 in. The position of the lower spindle can be adjusted so that its center is from 24 to 54 in. from the floor plate, thus giving a capacity for drilling holes in any position between these limits. The upright has a movement of 48 in. on the base either by hand or fast power traverse, the latter being reversible. Power for this traverse is supplied by a four-pole 3-hp. Otis Elevator Company's motor running at a speed of 800 r.p.m.

The machine is driven by an Otis Elevator Company's four-pole motor operating at from 300 to 1200 r.p.m. From the motor power is transmitted from spur gears, either directly or through back gears, to the vertical spline shafts A and B which are independently clutched. Fast power vertical elevation to the main spindle saddle is available by operating the lever C controlling the engaging clutch, and the table can be lowered by reversing the motor.

New Steel Car Plant at Michigan City

Some of the Interesting Car Building Equipment Installed at Works of the Haskell & Barker Car Company

The unprecedented building of steel under-frame and all-steel cars during the past year lends particular interest at this time to late methods and equipment for building this class of rolling stock. The necessity for having facilities under which fabrication and assembling can be carried on with the greatest possible economy and despatch was emphasized at the time when orders for thousands of cars were being placed. In anticipation of the period of car building through which we are passing, the Haskell & Barker Car Company began the improvement early in 1911 of its steel car building plant at Michigan City, Ind. This enlargement involved the remodeling of the existing shop and its extension to a length of 1100 ft; it included the installation of modern equipment, the building of a new power plant and the complete electrification of the plant drive on a 440-volt alternating-current system. An extension to the paint shop was also built, 300 x 300 ft. in size, housing eight painting tracks and with a two-story section for a tin shop, air-brake shop and door shop. The improvements were completed early in the spring of 1912 and capacity is now afforded for building 100 cars per day.

The new building is 285 ft. wide arranged in three spans, the spans being designated as shops A, B and C. The main span is 100 ft. wide. A general view of the shop interior is shown on this page. The arrangement of the building into three parallel shop divisions—shop A with four tracks traversing its length; shop B with three, and shop C with two, the last two more especially for handling stock and for the assembling of trucks—affords maximum flexibility in handling cars of different types and in assembling the required materials at the track location desired. Supplementing this convenient arrangement of floor space is an unusually complete installation of general and auxiliary crane service, an equipment which is a feature of the plant. Each of the three divisions of the shop is traversed through its entire length by main crane runways, elevated to give a maximum clearance and spanned by several 7½ and 10-ton Shaw electric cranes. Below these main cranes are sub craneways carried on structural framing from the floor and serving specific

floor spaces or machines. These are spanned by 3 and 4-ton Pawling & Harnischfeger cranes and are shown in the several accompanying illustrations. In addition these structures carry I-beams for floor operated and electric I-beam trolleys which further sub-divide the crane service made available. For handling material at the tools during the process of punching and shearing the usual jib cranes are used.

The machinery equipment includes the customary vertical and guillotine types of punches and shears and in addition a 1000-ton hydraulic press built by the Morgan Engineering Works. More unusual, however, are the heavy guillotine-type punches equipped with automatic spacing outfits, and punch gag controlling apparatus of which views are shown. These punches were built by Williams, White & Company, Moline, Ill., while the automatic spacing tables and gag controlling mechanism were furnished by the Standard Bridge Tool Company, Pittsburgh. Of the six punches installed, four are complete with automatic control.

The punches are specially arranged for working with the tables and are fitted with two rows, front and rear, of separately adjustable and automatically controlled gags. This automatic control is by means of the cylindrical drum shown, which moves one notch with each stroke of the punch and which throws in whatever combination of gags is desired in accordance with the setting of pins inserted in the drum. The entire operation is mechanical with each gag operated independently and fastened by a single bolt so that any one can be taken down without disturbing the remainder of the apparatus.

The spacing carriage controls the movement of the punch and when the carriage stops, as arranged for on the template the clutch on the punch is automatically thrown in. At the same time, by means of a contact switch mounted on the main shaft of the punch, the carriage is automatically started the instant the punches strip the material. With this arrangement the punches cannot operate while the carriage is moving the material nor can the carriage get underway which the punches are operating. The carriage is independently driven by a variable speed motor



General View in the Remodeled Car Shops, Showing 100-ton Hydraulic Press and Auxiliary Craneway Over Individual Fabricating Tools



The Spacing Tables, Showing Rack and Carriage with Four Car-Sill Plates Being Punched Simultaneously with One Setting of the Punch

mounted on the carriage and the material can be moved backward and forward at will. The entire apparatus while in operation is controlled by a single switch both for starting and stopping.

The capacity of the punches is indicated in the illustrations. One view shows the carriage pulling four sill plates. The angles are punched in pairs, fixtures being provided for holding them back to back and thus maintaining the gauge while punching. These gauges open to permit the material to move freely when the punches strip.

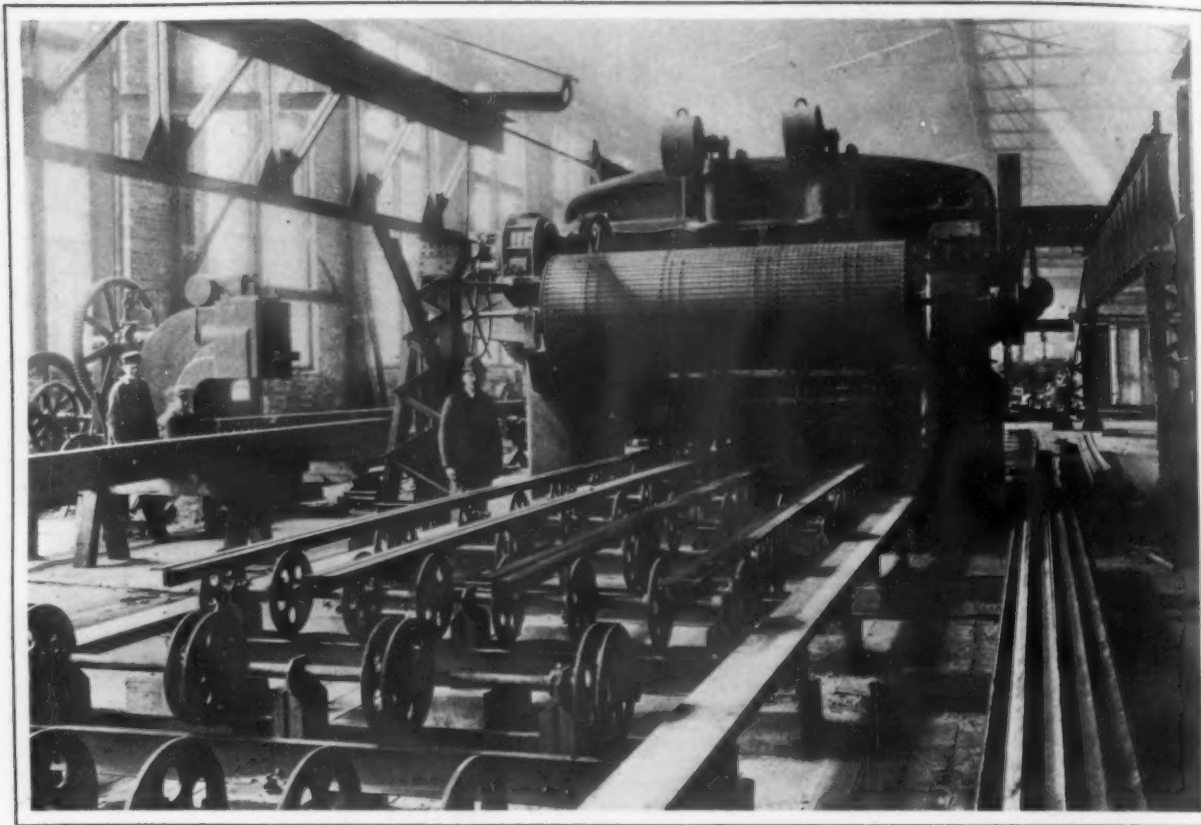
The new power plant which was designed and installed under the supervision of Krehbiel & Co., engineers, Chicago, presents an interesting layout both in the power generating room and in the boiler-house. The general arrangement was influenced somewhat by the necessary adjustment to equipment previously installed. The power room is featured by the special attention paid to lighting and by the fact that the well for pumps and auxiliary apparatus is

so located as to make each actuating machinery unit visible from the main floor. The main power units consist of three Allis-Chalmers 1000-k.v.a. turbo-generator sets with necessary exciters and condensing apparatus. Compressed air is furnished by one 4000-cu. ft. Ingersoll-Rand compressor and one of 2000-cu. ft. capacity. Two hydraulic pumps maintain a pressure of 1500 lb. through an accumulator.

A cross-sectional elevation of the boiler house is here given. The steam plant consists of six new McNauill water-tube boilers of 400 hp. capacity arranged in three settings; one is one side with an old boiler and there is space for the accommodation of two additional settings opposite the new boilers. The boilers are equipped with chain grate stokers and mechanical coal and ash handling apparatus. Coal is received on track over a concrete yard pit outside of the building and drops through a track hopper into a crusher from which it discharges into a 24 x



View Looking in a Direction Opposite to That Taken on the Facing Page, Showing Also the Arrangement of Cranes

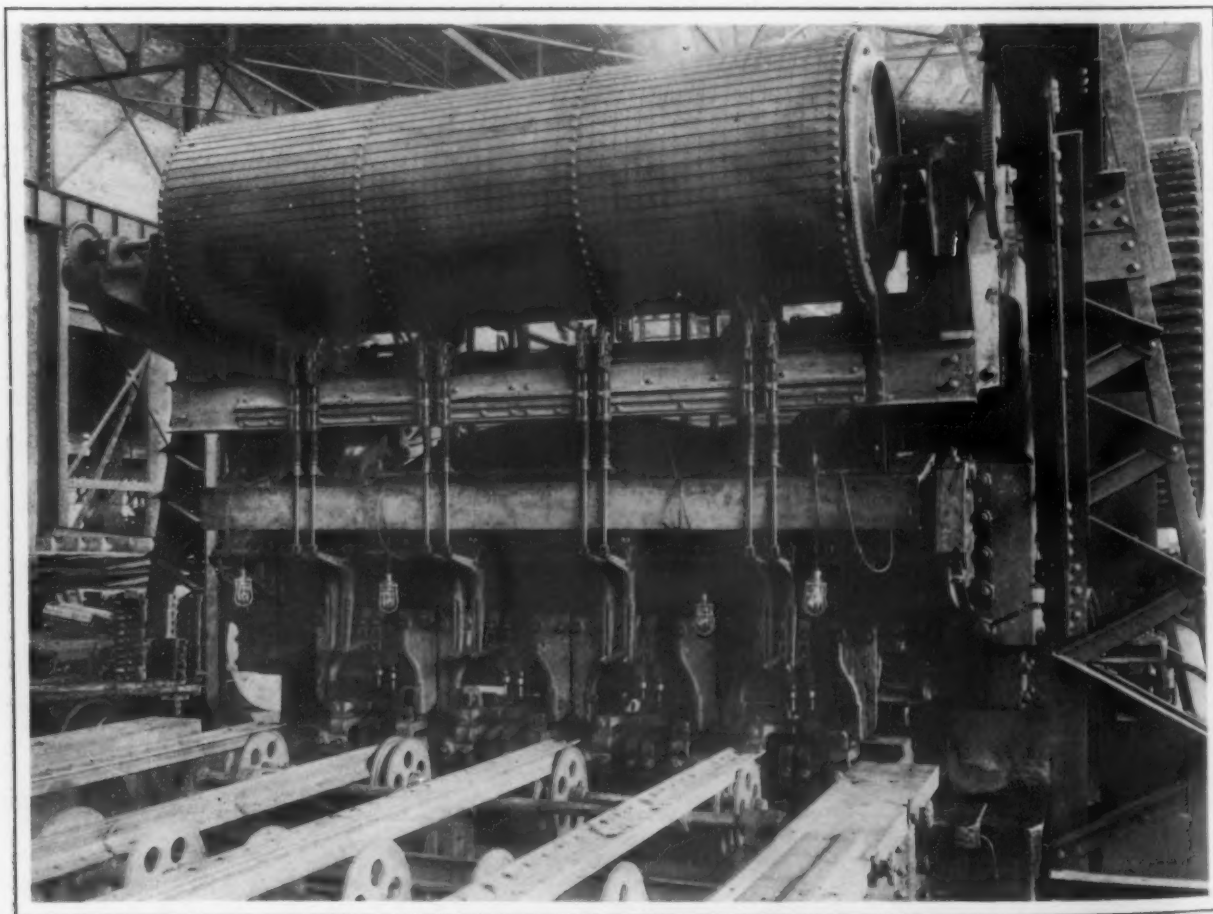


The Gag Controlling Apparatus from the Rear, Showing the Row of Punches in the Rear and the Angles Going Through

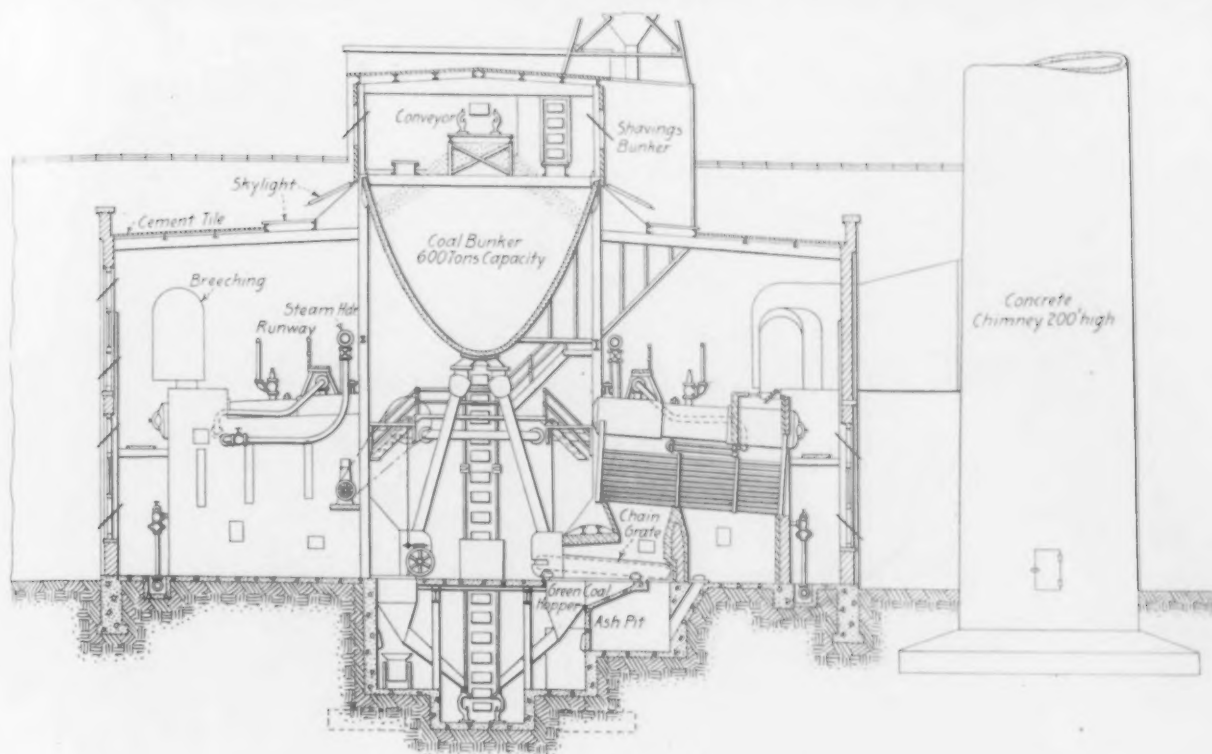
24-in. Peck continuous conveyor. This conveyor crosses in front of the boilers below the floor level, picking up the green coal dropping from the stokers and delivers the coal to a 600-ton parabolic bunker overhead. An overhead bunker for shavings is also provided arranged to feed this

material into the boilers as an auxiliary fuel. The ash is conveyed from below the grates to a bucket elevator and up into a overhead bunker from which it is discharged by chute into cars outside.

The entire plant improvement was completed without



Attachments on Punches and Apparatus for Automatic Gag and Spacing Control



Cross Section of Boiler House of the Haskell & Barker Car Company

any stoppage of associated departments of the works and was under the direct guidance of the car company officials, Krehbiel & Co. and Horace H. Lane, acting in the capacity of consulting engineer.

Test of Stellite Lathe Tools

Since the presentation of the paper by Elwood Haynes, of Kokomo, Ind., discussing stellite lathe tools, in treating of alloys of cobalt with chromium, etc., before the American Institute of Mining Engineers last October in Cleveland, additional information has been contributed to the records of the Institute by Albert R. Ledoux, New York, who reported a comparative test as follows:

On phosphor bronze, a superior high speed steel cut at the rate of 125 ft. per min., while with the stellite the speed was 900 ft. per minute. On tool steel cutting was done at the rate of 80 ft. per min. with a superior high speed steel, and at 133 ft. per min. with stellite. On steel seamless tubing, using superior high speed steel, the speed was 100 ft. per min. and with stellite 400 ft. per min. On cast iron the speeds were 100 ft. per min. with superior high speed steel and 200 ft. per min. with stellite.

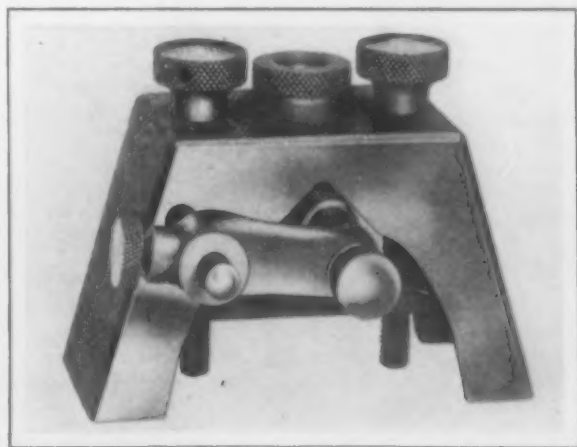
The stellite is an alloy of tungsten with cobalt and chromium, and some of the remarkable performances with the alloy were mentioned in the report of the Cleveland meeting in *The Iron Age* of November 7, 1912, page 1099. Mr. Haynes, who is president of the Haynes Automobile Company, emphasized at the time that the distinction of stellite was its capacity to cut more rapidly than carbon steel, rather than its capability of cutting material which could not be cut satisfactorily by carbon steel.

Preliminary experiments with the water power current from the Keokuk hydroelectric plant are expected to begin this month to test out the transforming and other subsidiary stations which have been constructed in St. Louis. The Mississippi River Power Distributing Company has completed its station at the northern edge of the St. Louis city limits. It has been so arranged that the high tension wires will enter at the northern end with the 110,000 volt current and will issue at the southern end of the building at 13,200 volts for distribution through the city. In the construction of the transformer station one entire end of the building is composed of rolling doors behind which the transformers, 12 in number, rest on wheels, the purpose being to enable the withdrawal of a transformer from the station, on tracks provided therefor, should it catch fire and so prevent the fire spreading.

A Jig for Drilling Holes in Round Work

For drilling round work so that a hole can be bored within about 0.002 in. of the center the M. B. Hill Mfg. Company, Worcester, Mass., has brought out a drilling jig. Although designed primarily for handling round work, it is nevertheless possible to drill taper pieces as well as those having two different diameters. In this latter class of work holes can be drilled close to a shoulder.

Two sizes of jig are made, the No. 1 taking work



A New Type of Jig for Use in Drilling Round Work Made by the M. B. Hill Mfg. Company, Worcester, Mass.

from 2 to $\frac{1}{2}$ in., while the range of the No. 2 is from $1\frac{1}{2}$ to $\frac{3}{16}$ in. Standard size slip bushings, varying by sixteenths from $\frac{1}{4}$ to $\frac{1}{2}$ in. in diameter, are furnished, one bushing going with each jig. For gauging the distance between the holes accurately, when two or more are drilled in a piece, or for securing the correct distance between the hole and the end of the work, an adjustable stop gauge is provided which can be set to the required dimension. The No. 1, or larger jig, weighs 6 lb., while the weight of the No. 2 is only $1\frac{1}{2}$ lb.

The Philadelphia Steel & Wire Company filed a voluntary petition in bankruptcy in the United States Court at Trenton, N. J., March 1. The liabilities are listed at \$215,132 and the assets are given as \$119,169. The company's office is in Philadelphia, Pa., and factory at Camden, N. J. It makes no wire but fabricates concrete reinforcing.

The Machine Finishing of Cylinders*

The Proper Sequence of the Various Operations—Advantages of the Different Types of Drilling Machines

—BY STUART DEAN—

When machining cylinders, it is best to mill them first and bore them afterwards. The following is a good sequence of operations: Catch the cylinders on the flanges in a line of chucks on the table of the milling machine. The chucks could be similar to the one shown in the sketch so that the cylinders would rest on four fixed points, two at each end of the cylinder. These bearing places catch the under side of the flange about 45 deg. on either side of the vertical axis. Mill off one end of the cylinder. Chuck the flange end against an angle block and mill the other end. Finally mill the remaining faces.

If there is enough duplicate work to make it pay, the cylinders should be milled in a machine with a cutter head on each side of the table and possibly with the third cutter on top. One pass then will finish both ends on one side of the cylinder. Such a machine would cost \$10,000, however, and the firm should have enough work to keep all three heads going all the time in order to make it pay. No matter what kind of machine is used, the operator should take off the machined cylinders and put on the rough ones while the machine is cutting, thus making milling a continuous operation.

Boring the Cylinders

From the milling machine the cylinders go to the boring machine. Several methods may be used for this process.

The cylinders can be chucked in a lathe and revolved, the boring being done with a stationary bar and cutter. They can be bored four at a time in a fixture on the carriage of a standard high power engine lathe. The lathe should be rigged with four parallel boring bars geared to the lathe spindle. They can be bored in a special boring lathe, having two spindles that bore from one end. The carriage of this machine has a turntable with bolted-on angle plates against which the ends of the cylinders are strapped, the castings having been milled before boring. While the machine is boring cylinders at the headstock end of the turntable the operator is removing the bored cylinders and putting on rough ones at another point on the turntable. This gives a maximum output from the machine and operator with a minimum pay roll expense.

One man on the milling machine and one man on the boring lathe can turn out 100 4 or 5 in. cylinders per day ready for drilling. A small floor area thus is very productive. This special boring lathe in some cases is made very elaborate by having a milling head travel across the end of the cylinders at the tailstock end of the table. The machine then bores and mills the cylinders at one chucking.

Using the Drilling Machine

A powerful 3 or 4 spindle heavy gang drilling machine might be used, the cylinders being set on end on the machine table in a suitable set of chucks for boring. With this outfit the output would be controlled by the speed at which a man can chuck and unchuck cylinders and change cutters if the cylinders are cast in pairs, they will be bored one casting at a time. If the cylinders are single bore castings, two castings are bored simultaneously.

Cylinders can also be bored vertically under very heavy drilling machines made for this work. Three single ma-

chines, side by side, run by one operator, will turn out more work and cost less than the two double special vertical machines usually bought.

The jig may be arranged so that after boring one side it can be moved over a fixed distance to bore the other cylinder. This style of boring machine allows the workman to chuck and unchuck the work while the machine is cutting on the other casting. The number of machines that one man runs can be increased until the maximum output is obtained from the man. Vertical boring has the advantage over horizontal boring of letting the hot chips drop clear. This keeps the cutter cool.

Advantages of Different Machines

Machine tool makers have not taken full advantage of the improvement in tool steel, especially as to drilling machines. Few radial drilling machines will drill to the destructive limit of a 2½-in. drill in cast iron, say, a feed of 35 in. per minute. Such a machine would do all the work for an enormous plant, one man running it and a second man bolting down the pieces and removing them. The drilling cost on a piece would be practically nothing. Many pieces under such circumstances would be drilled rather than cored, as drilling would be cheaper than coring.

A radial drilling machine will turn out work nearly twice as fast as a machine with a fixed spindle, because the moving of the drill from one hole to the next is done quickly on the radial tool and very slowly on the other style.

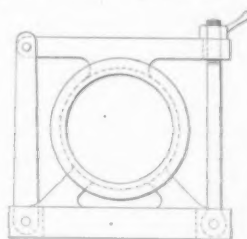
For all small drilling, say ⅜-in. holes and under, use a fixed spindle, light, sensitive, hand-feed drilling machine. On a sensitive machine the operator can feel when the drill catches and can prevent its breaking. From ⅜-in. holes up to and including about ¾-in. holes there are powerful little radial drilling machines on the market, which can be quickly handled. They have a large box table so that the operator can be strapping and unstrapping his work while the drilling is going on. This machine will drill a ½-in. hole 20 in. deep, a ¾-in. hole 12 in. deep, or a 1-in. hole 6 in. deep in 1 min. in cast iron. For ¾-in. holes and larger, and for pipe tap work, use a powerful radial or a powerful fixed spindle drilling machine with a table that can be moved across under the spindle in two directions.

The combination of a radial drilling machine set next to a horizontal one having a car with a turntable on it will save about three-quarters of the chucking and handling time on all large work if the car track runs from the horizontal drilling machine to and under the radial tool.

The horizontal machine will drill all the holes in the sides of a casting and the radial will drill holes in the top. The casting is strapped down to the turntable and revolved to present the four sides to the horizontal drilling machine.

Tapping the Cylinders

A cheap tapping machine can be made on the end of a double hinged arm attached to a post. The arm is hinged like a jointed wall gas fixture, so that the end can be moved over any point of a surface to be tapped. The post end will be attached to a heavy vertical bar of finished shafting so the machine can be set at any height to correspond with the work. The tapping machine, at the swinging end of the arms, is driven from the ceiling



Jig for Holding a Cylinder During the Milling Operation.

*Copyright 1913 by Stuart Dean. Sixteenth article on Shop and Foundry Management. The fifteenth article, "The Capacity of Metal Working Machines," was printed in the issue of February 20.

through a telescoping shaft, knuckle jointed at each end. This shaft is made from a square bar of key steel, which slides in an iron pipe with lead poured around the square shaft. Such a machine will do the work of three or four hand tappers.

It is sometimes found better to tap the holes on the

radial drilling machine at the time of drilling, for this saves an extra handling of the pieces. Studding may be done on this machine at the same time that tapping is done, though not always, as the exact length of the studs may not be known. Quick change collets, or couplings for drills, taps and stud drivers, speed this class of work.

Scientific Methods in the Study of Cast Iron

How They May Be Used in Solving the Problems of Divergent Physical Properties Where Ultimate Composition Is the Same

In his "Notes on Cast Iron," presented at the New York meeting of the American Institute of Mining Engineers February 19, Prof. Albert Sauveur of Harvard University took as his text the paper prepared for the Cleveland meeting of the Institute in October, 1912, on "The Effect of High Carbon on the Quality of Charcoal Iron." Referring at the outset to Mr. Johnson's statement that "different irons have different characters totally independent of their analyses, and that the presence or absence of these elements [carbon, phosphorus, silicon and manganese] alone will not account for all, scarcely for a half, of the facts which have long been known," Professor Sauveur said that while steel metallurgists had long ago

Certainly, a closer relation exists between its properties and its content of combined carbon than between those same properties and the percentages of all the other impurities put together, namely, graphitic carbon, silicon, manganese, sulphur and phosphorus. Why, then, are not determinations of combined carbon more frequent? Why, indeed, are they not invariably made? Clearly because we have no simple, quick and accurate laboratory method for the determination of combined carbon in cast iron. It is well known that in order to obtain an approximate knowledge of the percentage of combined carbon two rather long and tedious carbon determinations are needed, namely, determinations of total and of graphitic carbon.



Fig. 1—Gray Cast-Iron Free from Combined Carbon

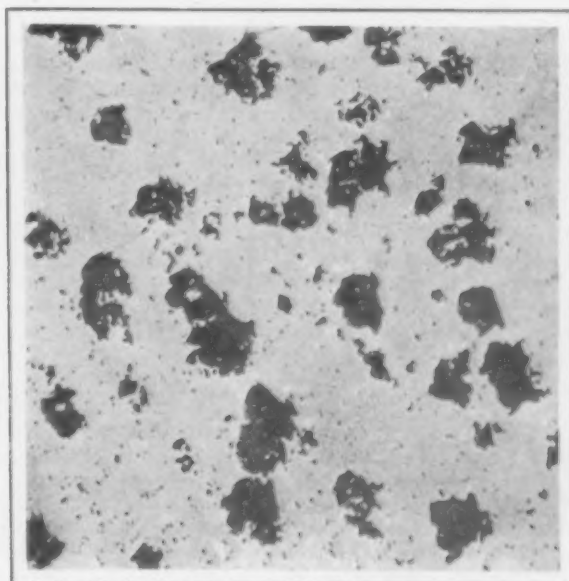


Fig. 2—Malleable Cast-Iron Casting. Not Etched

recognized thermal and mechanical treatments as well as chemical composition, blast furnace and foundry metallurgists had been indifferent to factors other than chemical analysis. Had they realized sooner the wisdom of applying scientific methods to the study of cast iron, solutions might possibly have been found long ago for problems now troubling them. The paper then says:

Importance of Carbon Determinations

"Many, not to say most [foundrymen], are still attempting to perform the feat of predicting the physical properties of castings from a knowledge of the percentages of silicon and sulphur they contain. We should, however, be fair, and when we say with Mr. Johnson that mechanical properties cannot safely be deduced from ultimate composition, we should recognize the fact that in foundry parlance chemical composition too often means nothing more than certain percentages of sulphur and silicon, or, at best, of sulphur, silicon, phosphorus and manganese, carbon-determinations being the exception and not the rule. And still it is, of course, primarily upon the percentage of combined carbon it contains that the properties of a casting, such as strength and softness, depend.

The one is then subtracted from the other, and, putting our faith in the accuracy of both, results are reported supposed to represent the percentage of combined carbon. If we bear in mind that as little as 0.1 per cent. of combined carbon may affect enormously the physical properties of cast iron, the utterly unsatisfactory character of this method 'by difference' is obvious. Indeed, foundrymen recognize the hopelessness of the procedure, and seldom call for carbon determinations, relying instead upon silicon and sulphur contents to guess at the probable percentage of combined carbon formed under certain cooling conditions. This is a distressing situation, for which a remedy should be found. The chemist who will devise a simple, quick and accurate method for the direct determination of combined carbon in cast iron will be entitled to the everlasting gratitude of foundry metallurgists.

Shape and Distribution of Graphite Particles

"I believe that if the analysis of cast iron always included determinations of combined and graphitic carbon the discrepancy between properties and composition would be less glaring. But there is another and very important factor affecting the properties of cast iron which is al-

most invariably ignored—namely, the shape and mode of distribution of the graphite particles. At this juncture the chemist necessarily fails us, and we must turn to the metallographist for assistance. It would be folly to assume that a certain proportion of graphite always produces the same effect, regardless of the size, shape and distribution of the particles in which that element occurs. To those who would hesitate to admit this fact we only have to point out the enormous difference in properties existing between gray cast iron and malleable cast iron, two metals which may conceivably be of identical composition. In the one instance, large, curved sheets of graphite, thoroughly breaking up the continuity of the mass, and producing weakness and brittleness; in the other, small, rounded graphite particles, leaving to the iron matrix much of its strength and ductility. These different occurrences of graphite are well illustrated in Figs. 1 and 2.

An accurate knowledge of the size, form and mode of distribution of the graphite would be a decided step forward in binding more closely together properties and composition. This is a problem for the metallographist to solve. He should find a method of ascertaining and of reporting the dimensions and forms of the graphite particles. There is no doubt that, other things being equal, the finer and less angular and sharp the graphite particles, the stronger must be the iron. Whether it will ever be possible so to control the casting operation that graphite will be made to occur in small, globular particles, as it does in malleable castings, thereby securing much greater strength, is in the present stage of our knowledge impossible to foretell, but it would be unwise to set the problem aside as an insoluble one. In 1900 I published a short note in which I showed the marked influence of the rate of cooling upon the form assumed by the graphite particles. Photomicrographs showing the structure of the same cast iron cooled respectively, 1, slowly in sand and, 2, more quickly in chilled mold, demonstrate that the quicker cooling resulted in the formation of rounded, star-like particles of graphite, which undoubtedly must have been accompanied by greater strength.

Finally, when considering the chemical composition of cast iron we should remember that Dr. Moldenke and others contend that the probable presence of varying amounts of oxides in the metal should be taken into account, as they may explain, in part at least, results seemingly at variance with the chemical composition as commonly reported.

Cast Iron of Maximum Strength

"As first pointed out by Professor Howe, cast iron should be regarded as a metal composed of a steel matrix and of graphite particles. Clearly, therefore, cast iron of maximum strength should have a matrix of maximum strength, and since eutectoid or slightly hyper-eutectoid steel is the strongest steel, cast iron of maximum strength should have a eutectoid or slightly hyper-eutectoid matrix, that is, it should contain some 0.80 per cent. of combined carbon. It is also evident that once the desired matrix is secured (through rate of cooling, silicon content, etc.), the fewer the graphite particles the better, which means that the lower the total carbon the better. This explains why strong cast iron can be made more readily from metal melted in an air furnace or, with the assistance of steel scrap, in a cupola furnace. In melting pig-iron alone in a cupola furnace, however, we have little control over the total carbon, which necessarily fluctuates between 3 or 4 per cent., according to silicon content and other conditions.

"The shape and mode of distribution of the graphite particles should, however, receive closer attention, as they certainly influence very decidedly the physical properties. Given two cast irons, having eutectoid matrix and identical chemical composition, but in which the graphite occurs respectively in sharp, large plates and in rounded, star-like particles, the latter will undoubtedly be the stronger of the two. Can we cause the graphite to assume the more desirable form? I have already called attention to the beneficial influence, in this respect, of relatively quick cooling during and below solidification. When a casting solidifies there are two factors, which regulate more than anything else the formation of the desired amount of combined carbon, namely, its silicon content

and the rate of cooling. It is universally known that in a small casting a larger proportion of silicon is required in order not to exceed the desired amount of combined carbon, because of its quicker solidification (due to its small dimensions), promoting the formation of combined carbon. Exactly the same proportions of combined and of graphitic carbon may be produced in a small casting through high silicon and relatively quick cooling, as in a large casting through lower silicon content and slower cooling, but it does not by any means follow that these two castings will have the same structure and hence the same properties. In the smaller casting, because of its more rapid cooling, the graphite particles will be smaller and less sharp; hence it will be the stronger of the two."

The author then presents a diagram illustrating the combined action of the rate of cooling and of the silicon content in determining the character of the matrix of cast iron, and the conclusion is reached that "to produce cast iron of great strength we should cause the formation of a eutectoid matrix by hastening its cooling in presence of considerable silicon."

The paper contends that a knowledge of the proximate analysis of cast iron is of greater value than a knowledge of its ultimate analysis, and it is shown how the proportions of the various constituents may be calculated, using the atomic weights of the elements present in the different chemical compounds. The structural constituents of commercial cast iron are then taken up, as distinguishable under the microscope—graphite, free cementite, free ferrite, pearlite and the phosphide eutectic to which Professor Sauveur would give the name "steadite" in honor of its discoverer. This structural composition may be calculated for any cast iron of its percentages of graphitic carbon, combined carbon and phosphorus are known.

Spots of White Iron Surrounded by Gray Iron

Concerning the phenomenon of the formation of spots of white cast iron surrounded by gray iron, to which Mr. Johnson's paper referred at length, Professor Sauveur says: "Mr. Johnson first rejects as unsatisfactory the explanation ascribing it to the pressure exerted upon the still molten center by the shrinking solid steel, a pressure which prevents the formation of graphitic carbon since such formation is accompanied by increased bulk. He rejects it on the ground that although iron of all grades cools under precisely these conditions, only a small percentage of it is spotted. Later in his paper, however, he offers this very explanation to account for the white spots of his iron. That it is the true cause of the formation of white iron centers seems highly probable and a little reflection will show that the absence of white centers in most pig iron is in keeping with it. There must be a period during the solidification of any iron casting when its still liquid interior is surrounded by a solidified shell. At that instant and during its solidification and further cooling this internal portion of the casting is subjected to three influences controlling the formation of graphite: 1, the presence of silicon promoting graphite formation; 2, slow cooling (the metal being now protected by the red hot shell), which also promotes the formation of graphite; and, 3, the pressure exerted by the now contracting shell, which opposes the formation of graphite. It is not surprising that in most cases influences 1 and 2 prevail and that graphite is formed in spite of influence 3. It is only when influence 3 is greater than 1 and 2 combined that white spots will be produced. For the same rate of cooling, therefore, which generally implies the same size of castings, white centers should be formed the more readily the less silicon in the iron, and for the same silicon content they should form more readily in small castings."

As to the percentage of carbon in the white spots Professor Sauveur agrees with Mr. Johnson that it should show a tendency to approach the eutectic ratio, since the white spots correspond to the metal solidifying last and it is natural that the most fusible constituent—the eutectic alloy—would tend to migrate toward the portion of the casting remaining liquid longest.

The later pages of the paper are devoted to a discussion of the phenomena of solidification of eutectic, hyper-eutectic and hypo-eutectic cast irons, the graphitizing of cementite and of eutectic, hyper-eutectic and hypo-eutectic alloys, with finally a comment on the behavior of cementite in steel.

The Discussion

I. E. Johnson, Jr., submitted in part the following in discussion of the paper: In pig iron, and even in castings, the amount of combined carbon varies so greatly from one portion to another that it seemed to us commercially impossible to obtain a sample from the pig which would be truly representative of it. It seems to us, as far as we have gone, that combined carbon is a product of the same conditions as those which control the quality, and is, therefore, an effect rather than a cause. The effect is indicated, for commercial purposes, by our tests for strength and a more detailed investigation of it, in view of the uncertainties above mentioned, seemed an unlikely field in which to look for the cause.

We are not fully satisfied of the correctness of this point of view in our own minds, but this, in conjunction with the pressure of other matters, has led us, as stated, to abandon investigations of combined carbon for the present. If any chemist shall discover an accurate and satisfactory method for determining combined carbon in cast iron, and also an adequate method of sampling, we shall regard him as a benefactor indeed.

Shape and Size of Graphite Particles

In regard to Professor Sauveur's remarks under this head, I can only say that if my paper failed to bring out our views as to the importance of this matter, then it has indeed fallen far short of our aim. I had supposed that the idea, not only of the shape and size, but of the arrangement of the graphite particles might almost be said to bristle from every page. If it does not do so it is merely another illustration of the fact that one can have, in his own mind, so clear a view of the importance of a certain conception that he unconsciously assumes that others will understand it in the same light without special emphasis.

The White Spot in the Center of Gray Iron

I think my paper has failed to make clear to Professor Sauveur in its entirety my conception of this matter, which may be briefly stated as follows:

1. The higher the carbon in iron the greater the tendency to form a segregate in the pig in about the same relative position as that found in a steel ingot.

2. This segregate is exposed to three sets of influences; slower cooling, due to the envelope of red-hot iron around it; the graphite-forming tendency of the silicon, and the pressure due to the solidified envelope around the segregate. In other words, two conditions are necessary for the formation of a white spot. The formation of a segregate due to a relatively high carbon. The presence of such an amount of silicon as will make the exterior graphitic without being able to force the graphitization of the segregate against the pressure of the solidified envelope.

I still maintain this view. If it be not correct I will ask Professor Sauveur to explain why the low carbon irons with about the same silicon range as that which, in the higher carbons, embraces the spotted iron remain entirely unspotted? I think this might be called the crux of my whole paper, and if my reasoning on this point is fundamentally incorrect, the paper as a whole has no value except that of a general description of the investigation, without engineering importance.

In regard to Professor Sauveur's criticism that my photograph (Fig. 5) does not represent the eutectic, but what may, in commercial language, be called the residual of the eutectic structure, I accept this correction. I had supposed that my high power photomicrographs showed clearly that this structure was one of pearlite and cementite, and that the language used was such as to make clear the fact that this structure was the breaking-down product of the eutectic, but I do not think this point was emphasized as fully as it should have been.

Carbon Contents of the Spot

In regard to the carbon in the segregate and its bearing on the question of whether this is the eutectic or not, there are two important points to be noted.

One is that the white spot in typical spotted iron is more or less intermingled around the edges with grey and, therefore, in drilling a sample for a carbon determination it is difficult, if not impossible, to avoid getting in some graphite, which may raise the carbon appreciably above that for the white spot alone. The second is that this white spot, like any white iron, will show both by analysis and under

the microscope the presence of a certain amount of graphite. If this graphite be what may roughly be called primary, as, in my judgment, a part of it is, this will account for a distinct increase in the carbon of the spot above what would be determined by the Wust and Peterson diagram.

It is well also in this connection to add another correction to that of Professor Sauveur. He says that our irons were not binary alloys of iron and carbon, but ternary alloys of iron, carbon and silicon. Let us go a step further and say that they are hexanary alloys of iron, carbon silicon, manganese, phosphorus and sulphur, and let us remember that at least two of the last three have an influence of keeping the carbon in the combined condition, precisely opposite to that of silicon in throwing it into the graphitic condition, and that its departure from the exact ternary ratio on that account not only does not prove that it is not the eutectic, but is on the contrary, in the direction in which the eutectic for the actual conditions should be expected.

The Evolution of Graphite

In the discussion of this matter Professor Sauveur introduces the phase rule, toward which my feelings, and those of many other practical men, are the same as the mingled fear and wonder with which the untutored savage regards the pivot-mounted machine gun, which can be turned in any direction at the will of the operator; it is impressive even if it fires only blank cartridges, and marvelously effective if it delivers bullets, or, in our case, facts. This similarity in sentiments has the same cause in both cases—the inability to understand the complexity of the organism even though composed of so many simple units.

I have no desire to become involved in the controversy raging among metallurgical scientists as to whether cementite separates out from liquid iron first and graphite is evolved by the breaking down of the cementite, or whether the graphite separates out from liquid iron as such. I cannot understand the close reasoning of the scientific arguments pro and con on this subject. But in regard to the facts I have some information, which I venture to say, will be corroborated by every furnaceman of experience.

Graphite may be seen rising from the surface of the iron as it runs down the runner, sometimes in such quantities as to fill the air with glittering particles like a black snowstorm, and this most frequently occurs when the iron is in its thinnest and most liquid condition. Its temperature I do not know further than that it is several hundred degrees above its freezing point.

If cementite were necessarily formed first, the evolution of graphite in such quantity would seem to imply the solidification of such a portion of the whole mass as cementite as would materially thicken it and impede its flow. The reverse, as I have stated, is the fact. But whatever may be the mechanism by which this transformation is accomplished, the objective facts are as stated.

If, now, the evolution of graphite as such involves the formation of a eutectic of austenite plus graphite, I am most willing to be set straight in this particular. The conception of graphite as being dissolved in the iron in a condition different from that of the other carbon contained therein is difficult for me to form, and, while I have no opinion to express upon it, there is one fact as yet only dimly known and not at all understood, which bears upon it, that white iron is of two kinds, one of which is much softer than the other.

I think it might be well to say that while my two statements were conflicting from the point of view of the phase rule, as pointed out by Professor Sauveur, the error was a technical one not particularly bearing on the facts, or on my explanation of the mechanism of the formation of spotted and high cleavage irons, because, first: the graphite does separate out copiously from the liquid mass (whether directly or indirectly I do not pretend to say) and this graphite rises toward the top of the pig, or any other mold in which the freezing iron may be contained, whether open or flaked. (In testimony whereof many castings could be displayed whose top surface, to the sorrow of the founder, consisted largely of graphite pockets instead of solid iron.) Second: the eutectic, whether it be austenite-cementite or austenite-graphite, breaks down into a final product of pearlite, graphite and cementite or ferrite in varying proportions, all of which actions take place

in the solid and do not affect the validity of my simple statements.

I have already confessed in the paper itself my inability and even my lack of desire to contribute anything to the advancement of these highly technical questions. The minds of practical and operating men are seldom attuned to so high a pitch. Moreover, the paper became far longer and more technical than I desired, in spite of my best efforts to the contrary, and even had I had the power, I should not have discussed these finer points bearing only on the science of the subject.

In spite of this I cannot escape the conclusion that my facts, and such deductions therefrom as are industrially important, have been left untouched by Professor Sauveur's acute and penetrating criticism.

Dr. Henry M. Howe admitted that the presence of oxygen had always been made the basis of the explanation why two specimens of cast iron seemingly similar are nevertheless not the same. He said it was difficult to understand how iron oxide could exist in cast iron after the deoxidizing influence of the blast furnace.

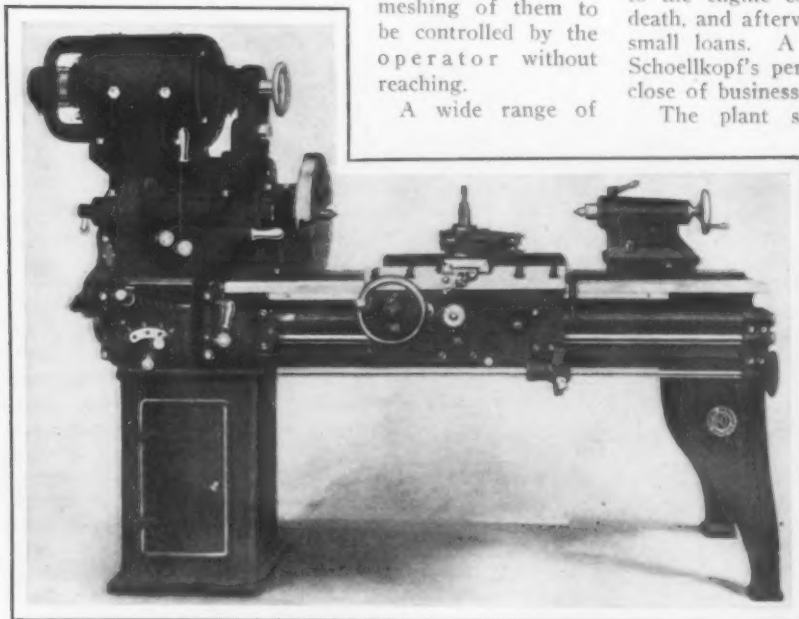
Dr. Richard Moldenke offered as an explanation of the existence of oxygen claimed in cast iron that there was re-oxidation of the iron sponge from the blast furnace, mentioning for example how the Pittsburgh tests of the cupola, conducted by the Bureau of Mines, had shown a persistence of oxygen considerably beyond the tuyeres. He ventured that the difference between hot and cold blast iron, between charcoal and coke iron, was due to the oxidizing. He referred to a casting of 0.22 per cent. sulphur which machined perfectly. Iron is not always injured by the sulphur but troubles are due to a damaged pig—melting has been done improperly and oxidation has resulted.

A New 14 and 16-in. Motor-Driven Engine Lathe

A new design of headstock arranged to support the driving motor is the special feature of a new 14 and 16-in. motor-driven engine lathe recently brought out by the Conover-Overkamp Machine & Tool Company, Dayton, Ohio. To secure a speed range to cover all classes of work a 3 to 1 adjustable-speed direct-current motor is used. Centralized control is another feature.

Two separate castings are used to form the headstock which is re-inforced by a large number of ribs to resist the stresses of heavy cuts. The use of this construction for the headstock is to eliminate loose gear guards, as the upper portion forms the base for the motor and completely covers all the running parts, while the lower section is the headstock proper. The location of the back gears in front instead of on the back of the headstock has effected a saving in floor space, as the tool can be placed close to a wall, it being unnecessary for the operator to go around the lathe to throw the gears in or out of engagement. At the same time their location in this position also enables the meshing of them to be controlled by the operator without reaching.

A wide range of



The New 14 and 16 In. Engine Lathe with Motor Drive Built by the Conover-Overkamp Machine & Tool Company, Dayton, Ohio

spindle speeds from approximately 13 to 400 r.p.m. can be secured by the use of a 3 to 1 adjustable-speed direct-current motor. In this way, as already stated, a speed range for all classes of work is secured. A drum type controller operated by a lever placed on the apron regulates the speed of the motor. It is found that the location of this lever which works in a vertical position at the right of the operator places it in a very natural and convenient position for the operator to handle. In addition all the working levers on the lathe are placed in front, so that the operator has full and quick control of the lathe at all times, thus saving many unnecessary steps.

From the motor shaft pinion, the power is transmitted through an intermediate gear to a friction gear on the spindle. The use of this gear enables the lathe to be started or stopped while the motor is running, thus permitting the latter to operate at its normal speed. The horizontal lever on the headstock operates the friction gear on the spindle. Either single back gears or double friction back gears are provided for the headstock and when the latter are used, they are controlled by a vertical lever on the front of the headstock.

The dimensions of these lathes are the same as those of the company's standard tools of the same size. This new tool can be furnished with quick change gears, as illustrated, or an all geared feed or a standard belt feed, as may be desired.

The Wisconsin Engine Company's Affairs

The schedule of assets and liabilities of the Wisconsin Engine Company, Corliss, Wis., which on January 21 filed a petition for a composition without adjudication, were received in the United States court at Milwaukee, February 27, and show assets of \$908,751.15 and liabilities of \$314,521.45. The schedules are signed by F. J. Kidd, treasurer, who is acting as general manager of the company for the trustee, the First Savings & Trust Company, Milwaukee.

It will be recalled that Henry Schoellkopf, vice-president and treasurer of the company, a well-known attorney-at-law of Milwaukee, and holding the largest individual interest in the concern, committed suicide early last December. It was stated at the time that a complication of business affairs induced the act, although those conversant with his affairs and those of the engine company believed the troubles more imaginary than real. It had been known for some months that the engine company was short of working capital, but was in no imminent danger. The death of Mr. Schoellkopf, however, threw affairs into a rather complicated state, and the remaining stockholders deemed it advisable to wind up the affairs and start anew. The schedules show that Mr. Schoellkopf advanced loans to the engine company at frequent intervals before his death, and afterward the administrator of the estate made small loans. A total of \$24,000 was advanced on Mr. Schoellkopf's personal account in this manner, but at the close of business all but \$7,905.44 had been repaid.

The plant suspended operations some weeks ago awaiting a settlement of the bankruptcy matter.

Leading business men of Indianapolis are arranging for the joint annual convention of the National Supply & Machinery Dealers' Association, Southern Supply & Machinery Dealers' Association and the American Supply & Machinery Manufacturers' Association, to be held there April 10, 11 and 12. Addresses of welcome will be made by Governor Samuel L. Ralston, Mayor Lewis Shank and C. C. Hanch, president of the Indianapolis Chamber of Commerce. Responses will be made by D. K. Swartwout, Cleveland, vice-president of the American association; S. M. Price, Norfolk, president of the Southern association, and W. L. Rodgers, Pittsburgh, president of the National association.

New Flexible Power Transmission Coupling

Pins of Sheet Steel Instead of Bolts
for Both Light and Heavy Service

A flexible coupling of simple yet interesting design, which has a wide range of application and is especially adaptable to direct-connected machines, is manufactured by The Francke Company, New Brunswick, N. J., with the Smith-Serrell Company, Inc., 90 West street, New York, as general agent. In appearance the new coupling, which is shown in Fig. 1, resembles the old-fashioned flanged type, but the flanges are connected by flexible pins instead of with rigid bolts and when the operation of the two are considered there are many important points of difference. It is the construction and arrangement of the flexible pins which present the most of interest as regards construction. They are inserted in a series of holes through each flange and, as demonstrated beyond question, permit of smooth and easy flexibility in every direction.

The pins which are illustrated in Fig. 2 consist of tempered steel leaves held at each end by a keeper which prevents their becoming loose. At each end the keepers are

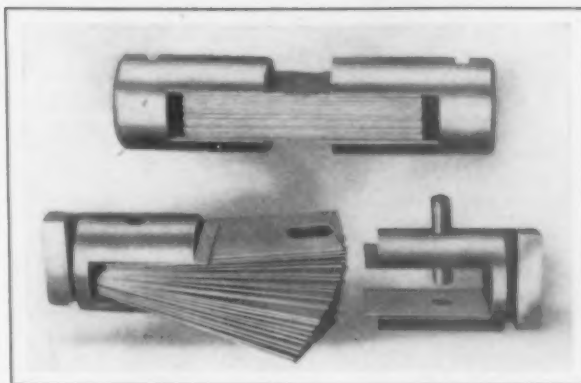


Fig. 2—Flexible Leaves as Francke Coupling Showing Slots in Steel Leaves. Slots in the Keepers, the Short Leaves Which Are Stationary, and the Pins

to any misalignment, while the leaves, of which there are a great many in each coupling, each bear a portion of the driving load. The action of the leaves has been compared to that of a carriage leaf spring and equal certainty of results and long wear are declared to be assured. Small hardened pins on which there is no strain hold the leaves in the keepers.

The action of the coupling when shafts are out of line and the coupling tends to run open on one side and shut on the other is shown in Fig. 3. A rigid coupling under like circumstances is liable to burn out bearings or break shafts. With shafts out of center the action is as in Fig. 4. With an ordinary coupling such a condition also means hard usage for bearings. The Francke coupling allows each shaft to run on its own center and each coupling in its own place. Combinations of the two movements shown in Figs. 3 and 4 compensate for any position two shafts can take when coupled together. A further advantage is that space taken by bolt heads and nuts is saved, allowing larger hubs

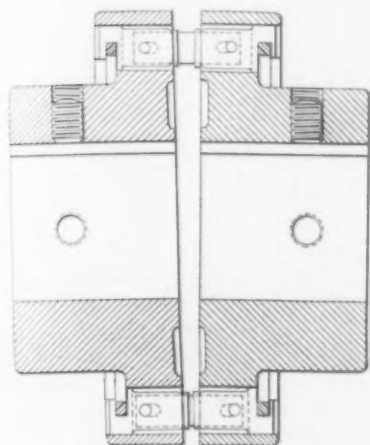


Fig. 3

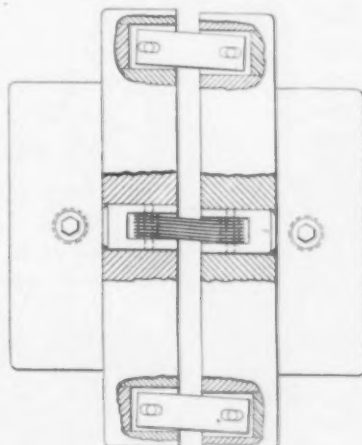


Fig. 4

Showing Operation of the Francke Flexible Couplings, When Shafts are Out of Line or Out of Center

slotted to engage spring steel rings which also fit in a groove in the coupling flanges, thus holding the leaves in a position radial to the center of the coupling and also holding the keepers stationary in the flanges. As shown in Fig. 2 all of the leaves are slotted with the exception of two short ones of soft steel at each end which are held stationary. The slots allow the coupling to adjust itself

for a given diameter, while the power transmission is found equal to that of rigid couplings of similar size. The new couplings are made up to a size capable of transmitting 300 hp. at 100 r.p.m., but there is claimed to be no maximum as to size, power or speed.

The smaller sizes for shafts $\frac{1}{4}$ in. to $\frac{3}{4}$ in. have commended themselves for magnetos and other small work. An important application has been their use on propeller shafts of motor boats, a use which necessitated slight alterations from the type heretofore described. For high speeds in connection with the operation of steam turbines, centrifugal machines and where conditions are otherwise severe, the couplings are made of forged steel. The smaller couplings also are made of steel. Points of advantage claimed for the Francke flexible couplings are the saving of power, prevention of hot bearings, allowing armatures to float in their true magnetic fields, safety, saving cost of sub-bases where units are direct-connected and otherwise eliminating the cost of obtaining perfect alignment.

Refrigerating Machines of Small Size

The H. W. Johns-Manville Company, Madison avenue and Forty-first street, New York, has become selling agent for the Audiffren-Singrun refrigerating machine recently put on the American market. This machine is of a size adapted to private houses, apartment houses, clubs, hotels, hospitals, butcher shops, etc. It was brought out in France over seven years ago and is therefore not in the experimental stage. It can be operated by an electric current and begins to make ice or produce cold when the switch is thrown in place. On account of its compact proportions it can be installed in very small space. Sulphur dioxide is used as the refrigerating agent. This can be condensed or liquefied at low pressure, thus eliminating all possibility of leaky connections, explosions, etc.

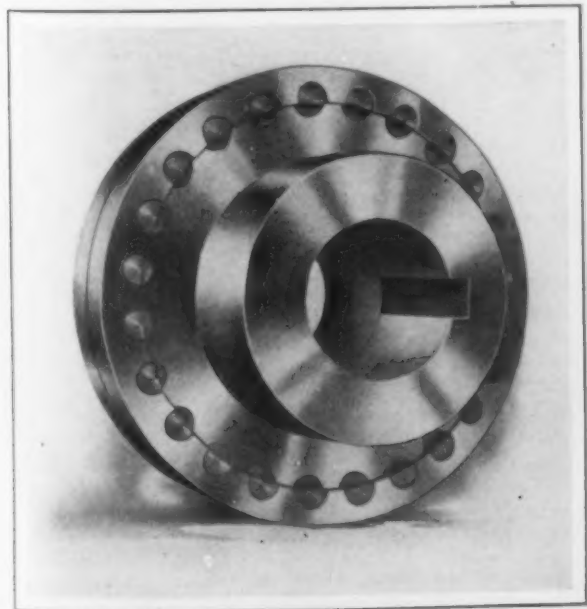
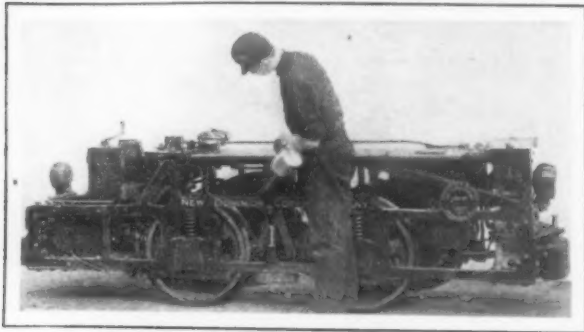


Fig. 1—Francke Flexible Coupling Assembled

New Type of Electric Locomotive for Mine Use

The Baldwin Locomotive Works, Philadelphia, Pa., and the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., working in conjunction, recently brought out a new type of mine locomotive. The notable features are the open cast-steel bar frame and the use of a specially designed commutating pole mine motor. Emphasis is laid upon the accessibility, durability and strength which dis-



A New and Improved Type of Electric Mining Locomotive Constructed Jointly by the Baldwin Locomotive Works, Philadelphia, Pa., and the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

tinguish this type of locomotive. It is claimed that the locomotive will operate satisfactorily under unfavorable conditions with a minimum amount of attention and maintenance expense.

The frame is designed to give a maximum strength and yet permit ready access to all parts, so that the locomotive can be inspected or overhauled when necessary in a short space of time. The use of the open frame, it is pointed out, gives better ventilation to the motors and resistance than is secured with the armor-plate type of frame construction. The motors, brake rigging, brakeshoes and sand boxes are easily accessible, and the upper portions of the motors and the armature bearing housings can be removed without disturbing the suspension, thus exposing every part of the motor for inspection. When it becomes necessary to remove the grid resistors, all that need be done is to take off the locomotive covers and loosen the bolts and terminals holding the resistor frames in place.

A special feature used on this locomotive when built with an outside frame is the Vauclain removable gib. If it is desired at any time to remove a journal box equipped with this gib, it is simply necessary to drop the binder and take the weight off the journal box which may then be slipped out from the side. Where inside frames are used, the journal box collars are arranged so that they can be easily dropped out for repacking. If it is desired to take out a set of wheels and the axle, this can be done without disturbing the motor suspension by simply blocking the motors in place and removing the binders, after which the wheels can be dropped.

Our Foreign Iron and Steel Trade in 1912

Exports Show a Heavy Increase Over 1911, but Imports Have Declined

The December report of the Bureau of Foreign and Domestic Commerce, Department of Commerce and Labor, enables the exact export and import figures for the whole of 1912 to be made up. The total value of the exports of iron and steel and manufactures thereof, not including ore, was \$289,128,420 in 1912, as against \$241,308,887 in 1911. The value of similar imports was \$29,328,709 in 1912 against \$28,995,600 in 1911. The total quantity of exports for 1912 was 2,938,489 gross tons, thus greatly exceeding the figures of 1911, which were 2,187,723 gross tons. The imports, however, show a falling off in 1912 as compared with 1911, being but 225,070 gross tons, against 256,295 tons in 1911.

The value of the December exports, not including ore, was \$23,750,864, against \$26,406,425 in November, while the value of similar imports in December was \$2,649,485, against \$2,793,448 in November. The December exports of commodities for which quantities are given totaled 235,953 gross tons. The figures for each month of the year are given in the following table, showing that May was the month when the maximum was reached:

Months.	Gross tons.	Months.	Gross tons.
January	158,772	July	272,898
February	203,666	August	282,836
March	217,991	September	248,743
April	267,210	October	250,746
May	307,654	November	237,341
June	273,138	December	235,953

Details of the exports of the same commodities for December and for the whole calendar year, 1912, as compared with corresponding periods of 1911, are as follows:

Exports of Iron and Steel.

Commodities.	December		Twelve months	
	1912.	1911.	1912.	1911.
	Gross Tons.	Gross Tons.	Gross Tons.	Gross Tons.
Pig iron	24,011	10,941	272,676	126,799
Scrap	9,326	3,989	105,508	77,918
Bar iron	2,234	1,015	21,925	17,683
Wire rods	6,984	3,925	65,023	22,641
Steel bars	16,350	11,397	208,213	123,349
Billets, ingots and blooms, n.e.s.	22,454	17,435	295,818	234,267
*Bolts and nuts	1,590	.....	49,986	.....
Hoops and bands	1,414	798	112,557	3,731
*Horseshoes	102	.....	7509	.....
Cut nails	539	946	9,311	11,422
*Railroad spikes	1,159	.....	76,669	.....
Wire nails	4,281	9,048	68,319	53,614
All other nails, including tacks	377	715	8,198	12,848
Pipes and pipe fittings	18,330	16,609	249,856	197,506
**Radiators and cast iron house heating boilers	639	384	5,912	4,063
Steel rails	35,279	22,874	446,473	420,874
*Galvanized iron sheets and plates	40,273	.....	169,959	.....
*All other iron sheets and plates	2,542	20,258	124,207	134,949
Steel sheets and plates	18,695	23,604	150,720	.....
*Steel plates	12,180	.....	135,601	237,423
Structural iron and steel	25,215	17,728	288,164	223,493
Tin andterne plates	4,534	6,651	81,694	61,381
Barbed wire	6,769	8,013	96,058	96,754
All other wire	10,676	14,520	148,653	133,008
Totals	235,953	190,850	2,938,489	2,187,723

*Included in "all other manufactures of iron and steel" prior to July 1, 1912.

†Figures cover period since July 1.

‡Included in "all other manufactures of iron and steel" from July 1, 1910, to June 30, 1911.

§Not separately stated prior to July 1, 1912.

**Included in "all other manufactures of iron and steel" prior to July 1, 1910.

††Figures are for six months, January to June, inclusive.

The December imports of commodities for which quantities are given totaled 21,230 gross tons. The figures for each month of 1912 are given in the following table:

Months.	Gross tons.	Months.	Gross tons.
January	20,006	July	17,902
February	11,622	August	20,572
March	15,968	September	18,740
April	12,479	October	25,557
May	15,949	November	24,152
June	21,407	December	21,230

The details of the imports of the same commodities for December and for the whole calendar year 1912, as compared with the corresponding periods of 1911, are as follows:

Imports of Iron and Steel.

Commodities.	December		Twelve months	
	1912.	1911.	1912.	1911.
	Gross Tons.	Gross Tons.	Gross Tons.	Gross Tons.
Pig iron	12,062	13,795	129,325	148,459
Scrap	2,712	650	23,612	17,272
Bar iron	2,606	1,607	26,111	26,729
*Structural iron and steel	254	244	3,120	11,597
Billets, bars and steel plates, n.e.s.	1,696	1,099	18,702	29,205
*Steel rails	195	335	3,780	11,000
Sheets and plates	204	379	3,299	2,451
Tin andterne plates	171	409	2,052	14,099
Wire rods	1,330	1,146	15,069	15,483
Totals	21,230	19,664	225,070	256,295

*Included in "all other manufactures of iron and steel," prior to July 1, 1911.

†Figures cover period since July 1.

Imports of iron ore in December were 199,982 gross tons, against 163,017 tons in November. The total quantity of iron ore imported in 1912 was 2,104,576 tons, against 1,811,732 tons in 1911 and 2,591,031 tons in 1910.

Employees of the Mt. Carmel Iron Works, Mt. Carmel, Pa., have obtained control of the business and will operate it as a cooperative undertaking. The officers of the new organization are A. P. Grimm, president and general manager; Henry Andrews, vice-president; Fred Schneider, secretary, and C. A. Gable, treasurer. The company will continue the manufacture of pumps, coal jigs and other cast iron press and machine work. It is claimed that this is the first cooperative iron works in that part of the State.

System for Keeping Costs in a Foundry

Routine for a Manufacturing and Jobbing Plant Requiring the Services of Only Two Men—Detailed Comparisons Possible

BY EDWARD A. BOYCE

This article outlines a cost system operating successfully in a foundry which is one of the several plants of a large corporation producing principally automobile castings for its own use in connection with a jobbing business. This system requires the services of two compe-

office, copies being sent to the foundry superintendent, coreroom, cost clerk and pattern clerk. The cost clerk fills out the job cost card and the foundry shipping record, both of which are shown at the left of Fig. 2, the latter being the upper one, and forwards his copy of the order to the shipping clerk, who keeps a record on it of all the castings shipped, and as soon as the order is completed returns it to the cost clerk for filing. From the copy which is sent to the pattern clerk, the molder's card shown at the right of Fig. 2 and the pattern record card Fig. 3 are filled out by the pattern clerk upon receipt of the pattern. The latter form which gives a complete record of the pattern is kept on file in the pattern vault. The molder's card Fig 2 is attached to the pattern by the pattern clerk and is delivered to the foundry pattern room. The coreroom and foreman's portions of this card are detached and delivered to them in order that they may know that the pattern is in the foundry and may plan their work accordingly. When the pattern is put in the sand the molder retains his portion of the card until the required number of pieces are made, and on the back is recorded each day the amount of good castings and the discards.

SHOP PRODUCTION ORDER ORIGINAL									
NO. 6001		DATE Dec 1		JOB 2		ORDER NO. 60.1			
QUANTITY 25 PART NO. X500 DRAWING NO. Piston NAME Castiron Co. - Pattern DEPARTMENT 1000 ORDERED BY A. S. S.									
THE FOLLOWING MATERIALS TO BE USED C. A.									
DATE COMPLETED Dec 6/12 ORDERED BY C. A. Smith ORDERED BY J. S. Smith								PRICE BOOK 25 PRICE SHEET	
(CHARGE ALL TIME AND MATERIAL TO THIS ORDER AND RETURN TO OFFICE WHEN AS COMPLETED)									

Fig. 1—The Production Order Which Is the First Form Filled Out When an Order is Received

tent men, a timekeeper and a cost clerk, and of course must have the co-operation of the foundry superintendent and his subordinates.

Orders

Upon the receipt of an order for castings, a production order, Fig. 1, is issued in the general production

Melting and Casting Records

The analysis of each carload of pig iron together with other information is furnished the foundry superintendent on a card form known as the analysis card which is reproduced in Fig. 4. Upon this card space is provided for keeping a record of the amount of material used from each car. Each forenoon the number of ladles of

FOUNDRY SHIPMENT RECORD														
DATE 12/1		ORDER NO. 6001		QUANTITY 25		PATTERN NO. X500 NAME Piston					KIND METAL C. A.		FORM 200 10-10-12 6 x 6	
FIRM Castiron Co.						AVG WGT 5.2					NO. PER MOLD 1			
DELIVERIES as usual														
DATE	SHIP. NO.	NO. PIECES	WEIGHT	BALANCE TO SHIP	DATE	SHIP. NO.	NO. PIECES	WEIGHT	BAL. TO SHIP	DATE	NO. PIECES	WEIGHT	REMARKS	
12/6	1000	25	125	0						12/9	1	5.2	Discard	

JOB COST CARD														
FOUNDRY ORDER NO. 6001		PART NO. X500		NO. PIECES 25		DATE 12/1/12								
DESCRIPTION Piston		C. A.		FIRM Castiron Co.										
DATE	NO.	GOOD	DATE	WORKER'S NO.	HOURS	RATE	PIECE WORK	DAY WORK AMOUNT	CORE MAKING	NO. PCS.	DATE	WORKER'S NO.	HOURS	RATE
30	✓	25	12/6	1118	3	.26		1.58		30	12/6	1118	3	.26
										MOLDING LABOR 3 CORE MAKING LABOR 2 MOLDING - BURDEN .0725 CORE MAKING .0725 BURDEN PER POUND .0021 MOLYEN METAL .0075 TOTAL COST 4.74				
NO. PIECES CAST 25 WEIGHT 125 PCS. PER MOLD 1 COST PER LB. .0318 COST EACH .77														

MOULDER'S CARD	
This Card must follow Pattern until Order is completed.	
Firm	Castiron Co.
Date	12/6
Order No.	6001
Pattern No.	X500
No. on Gate	-
No. Pcs. Ordered	25
Remarks	As usual

CORE ROOM CARD	
This Card must follow Pattern until Order is Completed.	
Firm	Castiron Co.
Date	12/6
Order No.	6001
Pattern No.	X500
No. of Core Boxes	
No. Cores Wanted	30
When Promised	As usual

FOREMAN'S CARD	
Firm	Castiron Co.
Date	12/6
Order No.	6001
Pattern No.	X500
No. on Gate	
No. Pcs. Wanted	25
When Wanted	As usual
When Promised	N
Remarks	As usual

Fig. 2—Three of the Forms Used in the Foundry; the Foundry Shipping Record at the Upper Left with Job Cost Card Below and the Molder's Card at the Right

CLEANING DEPARTMENT REPORT

HEAT OF <u>see 2</u> 1912													
Date	Molters Name	Part No.	NAME	Shop Order No.	No. Pcs. Per Mold	No. Molds	Total Pieces	CASTINGS					TOTAL WEIGHT
								Good	Weight	Molters Loss	Shop Loss	Weight	
11/15	J. Brown	X 500	Piston - Castiron	6001	1	30	30	25	185	4	1	27	162

Fig. 7.—The Daily Report of the Cleaning Showing the Number of Good and Defective Castings Secured from Each Mold and the Cause of the Loss

an hourly basis inasmuch as there are overhead charges which increase and decrease with tonnage and others which are permanent charges regardless of the amount of tonnage produced. Referring to the distribution sheet, the first five items of overhead are made up of indirect labor and with defective castings, supplies, power, heat and light, constitute the amount that is to be prorated each month over the total number of pounds of good castings produced to give an overhead charge per pound. The charges under "Overhead on hourly basis" do not fluctuate with the amount of tonnage and the total of these charges for the month, divided by the number of indirect labor hours in the gray-iron department will give the molding overhead rate per hour or 0.2333 c. as shown on the distribution sheet.

Table I on page 604 shows a comparison of this method as against the percentage basis.

This job would bear 16c. more overhead on the hourly basis than on the percentage basis inasmuch as it was

actually in work 8 hr. and should consume a portion of the overhead for each hour it is in work. A molder at 25c. per hour might produce as much work as a molder at 35c. per hour, in which case there would be quite a variation between the amount of overhead charged to their jobs on the percentage basis and on the hourly basis, although the molders might work an equal number of hours on the job. In a case of piece work, it is more accurate to apply the overhead to a job on the tonnage and hourly basis than on the percentage basis, which is illustrated in Table II on page 604.

W. Williams
Zurich

Each Is Filled Out by
Each Lot of Cores
Makes

This illustrates the advantages of figuring the overhead of the core-room on the hourly basis whereby production of piece work may increase or decrease per day without affecting the overhead which would not be true on the percentage basis.

The distribution sheet illustrates the method of arriving at the overhead rate per pound and per hour for the gray-iron department and coreroom and also the method

CORE CHECK SLIP

Date 12/9 1912
Clock No. 1920
Pattern No. X 500
No. Cores 30
O. K'D by J. N. Williams

Fig. 8—The Slip Which Is Filled Out by the Core Maker for Each Lot of Cores He Makes

DISTRIBUTION OF LABOR AND OVERHEAD EXPENSE FOR MONTH.....					Direct O.H. On O.E.on Hourly Basis O.H. O.E. C.H.						
	GREY IRON DEPARTMENT	1	2	3	31	Labor	Tonnage	Total General	Total Per Hr	Per Td	%
Direct	Molding Labor ----- Hours Amount					708.94 3-16-14					
	OVERHEAD ON TONNAGE BASIS										
	Cupola Tender						170.00				
	Cupola and Ladle Repairs						24.00				
	Unloading Material						146.00				
	Cleaning Castings						107.00				
	Pattern & Flask Repairs						100.00				
	Defective Castings Returned						40.00				
	Supplies						100.00				
	Power, Heat & Light						78.00				
	Total						1400.00		16.00 per	100%	
	OVERHEAD ON HOURLY BASIS										
	Supervision						(100.00)				
	Miscellaneous Indirect Labor						66.00				
	Repairs & Maintenance						100.00				
	Power, Heat & Light						280.00				
	Total						526.00	400.00	1.60 per	100%	
	COKE ROOM										
Direct	Coke Making Labor --- Hours Amount					45.00 4-10-14					
	Supervision						70.00				
	Indirect Labor						200.00				
	Repairs & Maintenance						100.00				
	Supplies						100.00				
	Power, Heat & Light						40.00				
	Depreciation						100.00				
	Total						720.00	400.00	1.60 per	100%	
	PLANT GENERAL O.H.CHARGES							100.00			
	Salaries						100.00				
	Repairs & Maintenance						100.00				
	Insurance & Taxes						100.00				
	Power, Heat & Light						100.00				
	Misc.Freight,Express & Crtg						100.00				
	Depreciation						100.00				
	Defective Castings Returned						600.00				
	Miscellaneous Expense						100.00				
	Total						1000.00	400.00	1.60 per	100%	
	Total Expense							400.00			100%
	Total Direct Labor							400.00			
	Total Material							200.00			
	Total Cost of Production							600.00			
	Good Castings							400.00		100%	

Fig. 9—The Distribution Sheet Which Gives the Various Amounts Charged to Labor and Overhead Accounts Each Month. Spaces Are Provided So That the Figures Can Be Entered Every Day, but Only the Monthly Totals Have Been Reproduced to Secure Clearness

of prorating fixed charges which cannot be traced directly to either department and which are classified as "Plant General Overhead Charges." These charges, which are

Table I—A Comparison of the Hourly and Percentage Basis of Figuring Overhead Cost.

Direct labor 10 men, 1 day, 100 hr. Average rate 30c. per hr.	\$30.00	
Overhead, 30c. per hr.	30.00	100%
Time charged to a job that day:		
Molder 4 hr. at 36c.	\$1.44	
Helper 4 hr. at 20c. ....	.80	
Overhead, 8 hr. at 30c.	2.40	
Overhead 100%	2.24	
	.16	

prorated according to the number of direct labor hours in each of the above departments on the basis that the department which is producing the most work should bear the largest portion of these charges, are added to the total expense of each department. This sheet when completed will show all overhead rates, percentages, the total operating expenses, direct labor and the cost of production for the month.

Metal Cost Report

The information necessary for this report which is reproduced in Table III. on this page is obtained from the daily melting reports Fig. 10 for the month and the distribution sheet Fig. 9. This report when complete

Table II—A Comparison of the Tonnage and Percentage Basis for Figuring Coreroom Overhead.

Core maker makes 100 cores in 10 hr. at 5c. each....	\$5.00
Core maker makes 90 cores in 10 hr. at 5c. each....	4.50
Overhead on 100 cores at 100%.....	5.00
Overhead on 100 cores in 10 hr. at 30c. per hr.	3.00
	\$2.00
Overhead on 90 cores at 100%.....	4.50
Overhead on 100 cores in 10 hr. at 30c. per hr.	3.00
	\$1.50

will give the cost of producing iron from the cupola, the total cost of castings per pound, the percentage of bad castings, the loss in melting, etc. It also contains a comparative record of the percentage of good and bad cast-

DAILY MELTING REPORT					
Cupola No. _____		Date <u>Oct 1</u>			
CHARGE	WEIGHT	TOTAL WEIGHT	Production	WEIGHT	TOTAL WEIGHT
Scrap Pig Iron <u>4426</u>	11793		Good Castings	76077	
Pig <u>4480</u>	2304		" " Job	32400	
Scrap Pig <u>78226</u>	16062		Total Good		
Pig <u>36679</u>	763				
Pig <u>21156</u>	1706		Defective Castings	7993	
Pig <u>14293</u>	6330		" " Job	6281	
Pig			Total Defective		
Pig					
Total Pig		29963	Waste Iron	7859	
Scrap	7197		Scrap Returned	10322	18184
Remelt	7188		Shot		212
Serves	23976				
Shot	800		Lost Metal	6124	
Steel Scrap	818				723
Good Castings	4097	46076			
Total Metal		85059	Total		18009
Coke	11800				
Flux					
Wood			Wind Pressure		
Total Fuel			Break Test		
			Shrinkage Test		
			Melting Ratio	101	
Blast on <u>7.30 P.M.</u>					
" off <u>4.40</u>					
Total Time <u>1.10</u>					
Signed _____					

Fig. 10—The Daily Melting Report Which Shows the Total Amount of Material Used Each Day

ings, sprues and melting loss for the three previous months and enables the foundry superintendent to detect any great variations. This form also contains a comparative record of direct labor and overhead charges per pound from which any deficiency in labor or increase in overhead per pound may be readily detected.

Table III—Metal Cost Report for March

Material	Weight	Amount	Total	
Pig iron, Zug	319,068	\$2,003.92*		
Pig iron, Toledo cast	215,059	1,383.49*		
Foreign scrap	38,800	233.24		
Home scrap	290,900	2,066.84		
Steel scrap				
Total charge	863,827	5,687.49		
Deductions				
Bad castings	97,636	693.70		111
Sprues, etc.	193,700	1,373.24		122
Melting loss	49,555			163
Total deductions	340,891	2,066.94		
Good castings	522,936	3,620.55		1603
Coke, 141,805 lb.		377.68*		
Molten metal cost		3,998.23	\$3,998.23	\$0.00765
Direct molding labor		3,256.94		
Direct core making labor		2,022.73	5,279.67	\$0.01774
Molding O. H. on tonnage basis		1,625.10		
Molding O. H. on hourly basis		1,863.43		
Core making O. H. on hourly basis		1,270.50	4,759.03	
Total cost castings per pound			14,036.93	\$0.02684
COMPARATIVE RECORD	September	October	November	December
Average pounds good castings per day	584†	60†	644†	604†-(20,000 lb.)
Average pounds bad castings per day	104†	9†	7†	11†-(4,000 lb.)
Average pounds sprues, etc., per day	23†	24†	22†	22†-(7,503 lb.)
Average pounds metal loss per day	74†	7†	64†	64†-(1,500 lb.)
Average pounds metal used per day	100†	100†	100†	100†-(33,000 lb.)
Average pounds coke used per ton metal melted		340	315	328
Molding labor per pound, cents	0.0072	0.0065	0.0059	0.0062
Core making labor per pound, cents	0.0041	0.0040	0.0033	0.0037
Molding overhead per pound, cents	0.0043	0.0044	0.0029	0.0035
Core making overhead per pound, cents	0.0037	0.0033	0.0022	0.0027
Molding O. H. per pound (tonnage basis), cents	0.0044	0.0036	0.0029	0.0031
Total labor and overhead per pound, cents	0.0237	0.0218	0.0172	0.0192
Molten metal per pound, cents	0.0081	0.0078	0.0069	0.0076
Average cost of castings per pound, cents	0.0318	0.0296	0.0241	0.0268

*Price of pig iron is \$14.21 per gross ton, and coke \$5.35 per net ton.

†Percentage of total output for month.

‡Cents per pound.

To obtain the cost of an order of castings the job cost card shown at the lower left portion of Fig. 2 which contains both molding and core making labor as taken from the time tickets and the number and weight of castings made is summed up and by adding the molten metal cost and overhead charges as shown, the total cost of the order is obtained. From the total cost of the order the cost of the castings per pound and cost of each one is obtained.

Frequently it is necessary for the foundry superintendent to make an estimate of the cost of a quantity of castings and for this purpose the reverse side of the card is used. When the order for the castings is received and put in work, the foundry superintendent is able to follow the job by referring to the job cost card and ascertain whether or not he is getting the proper amount of production on the order to enable him to meet his estimate and make a profit on the job.

The overhead rates and molten metal costs for the previous months are used in making estimates and figuring costs during the current month.

Overvaluation of Management Science*

The Present Conditions After
Ten Years of Propaganda

BY JOHN CALDER

In 1897, fifteen years ago, there were signs that technical education was increasingly furnishing for practical control of the arts, as distinct from laboratory work, men with the scientific discipline and a passion for facts. This was the unformulated and largely unnoticed beginning of the new element in management, not a few of the younger shop executives having been mentally prepared for the advance before it had taken practical shape or been accorded recognition by the owners of businesses.

Initially, and still inherently, the advance was not specific new shop methods or new systems. It was a new mental attitude toward practical problems by a small but increasing body of administrators, who regarded such questions as no longer outside the pale of scientific solution. Five years later the earnest desire for the truth about business began to be reflected in the technical press and in the proceedings of the professional societies, both here and in Europe.

Science First Applied to Accounting

An analysis of such publicity, which the writer made at that time, showed that the directors of the metal working trades in particular had followed the path of least resistance and applied the new method largely from the accounting side. The resulting more reliable inventories and costs brought out the facts of inefficiency to a limited degree and started some reforms, but comparative costing alone could not establish standards of shop performance and methods of attaining these. The accountant, though first in the field, had yet to be supplemented by the experienced engineer with an all-round discipline and the new view-point of the problems of management. The temporary recession of business prosperity in 1903 increased the interest in the rise of the new movement, which was seldom consciously "scientific," but was, nevertheless, actually so and held in it the germ of all that has followed.

The general "problem" of industrial establishments, however, is first and last economic, and may be compressed into a single sentence. It is: "To furnish daily the prescribed quantity and quality of product in all its varieties by the most efficient shop and labor arrangements and with a minimum of fixed and cash capital locked up in the process." A productive organization and a system of plant management which will accomplish this and continue to do so with harmony and to the satisfaction of employer and employee alike is the desired end.

Review of the Past Ten Years

Ten years ago the recognized divisions in management were being modified, more or less consciously, under the influence of the scientific method. These divisions were chiefly as follows: Invention, purchasing, selling, account-

ing, costing, stock keeping, shop instructions, stock routing and tracing, warehousing and shipping product, the division of labor in all efforts—intellectual, manual and mechanical; the improvement and standardization of designs and product and of the whole equipment of industry—buildings, machinery, producing tools and operating methods; the study of tasks, the division of supervising functions, the various labor reward expedients and incentives and the improvement of industrial hygiene. These divisions remain intact to-day, but in practically all of them the scientific method has made itself felt and marked developments in detail have taken place.

Early in the movement for greater efficiency, considerable gains were made in some general machine shops through adopting, as far as possible, intensive methods of production, which had long been common in repetition work industries. These had little or no scientific origin, but the results were often far in advance of average practice, and in the course of long trial they closely approached the best scientific performances obtained by quicker and more direct means. In able hands the intelligent and effective use of these divisions led naturally to intensified results and economics, but the essence of the new departure was something apart from progressive imitation. It consisted in a program of deliberate reconsideration of all the details of shop practice, using the thoroughness and disciplined judgment of the scientific method already defined.

It was at this stage of the movement that a number of accountants, followed by a few engineers, specialized in the promotion of industrial efficiency and from time to time, published their "systems" or particular methods of coordinating in detail the divisions of effort already named. Foremost and most important of these systems was that now termed scientific management, which F. W. Taylor advanced in 1903 as an outcome of his long continued and valuable researches into the art of cutting metals.

Many, however, who are convinced that the application of the scientific method is the inevitable and natural course in the evolution of industry and of business, are by no means agreed that Mr. Taylor's solution, or indeed any of the formulated systems which have followed it, are equal to the requirements of industry as a whole. They believe that the range of current dogmatizing has exceeded the evidence; that before adequate and general formulation can be made it is necessary to continue for some time applying the scientific method to a larger variety of industrial problems. This should be done untrammelled by any hypothesis or by the stereotyped elements and details that quite naturally form the scaffolding, and sometimes the only original parts of various systems, which have solved more or less successfully a few specific cases.

What Has Been the Result of the Ten Years

What then have we to show for ten years' progress in the economic administration of industrial establishments? Apart from natural progress in the suitability and efficiency of buildings and equipment, helped considerably by the scientific view-point of what is desirable, by Mr. Taylor's researches and the later inventions of others, there is not a great deal visible upon the surface, and the bulk of our industrial plants have still to respond in their details of management.

Nevertheless our shops now possess in their executives of all grades a much larger number of men possessing both the scientific and practical discipline, and need only the benefit of competent counsel and leadership to make a considerable advance during the next few years. All of the elements already named are regarded in our progressive plants in quite a different light from ten years ago. They are being developed scientifically and are being used from every angle as reliable and valued aids in production and management.

Statistical information formerly carelessly gathered and seldom consulted is now accurately recorded for definite economic uses. Similar progress is found in the whole range of topics already cited as covering plant operations. In a word, a foundation has been laid, necessarily largely out of sight, which like all such work seems to the impatient to have had more than its proper share of attention, but those carrying the burden of administrative responsibility, and realizing the far-reaching character of the movement, are not disappointed.

*From an address made in January before Stevens Institute of Technology, Hoboken, N. J., on "Management in the Modern Plant."

If the passion for facts is not allowed to be dulled by the natural tendency to stereotype the methods of attacking industrial problems, gratifying progress along scientific lines is sure to be recorded during the next decade. As in all true science, existing hypotheses and generalizations, which have done good service in concentrating thought, will be gradually modified to cover the large range of experiences which have not yet been taken into account by the pioneer constructors of systems.

Reflections on Ways and Means

Such a program as has been outlined by Mr. Taylor, for instance, is a formidable task to carry out simultaneously with the rapid growth of industries and plants. It can barely be said to have made any impression outside of machine shops, and it has gone only a short way in these. It is not often desirable, considering the vicissitudes of business, to commit any one concern to a very elaborate program of reorganization involving years of transition experiences and expenses. It is still needful for men believing in the scientific method, but more conservative and experienced than the ardent systematizer, to hold the reins of business and guide the team. The commercializing of professional counsel on system demands this warning, for it has led not seldom to predictions and implications which have proved anything but scientific in respect to their accuracy and insight.

Among observed undesirable characteristics of systematizing practice the following may be mentioned:

1. The publication and quotation of statistics regarding gains made through the use of particular systems, without a frank statement of the degree of inefficiency of the plants before reorganization. Proprietors do not need claims of 100 to 200 per cent. increase of product from the same equipment to interest them in the movement. They do require, however, to have some reliable information as to the condition of affairs out of which such results were obtained. Where the plant was very inefficient, the significance of the results is much reduced.

2. The failure to view the plant from the investor's standpoint rather than as a laboratory offering opportunities for interesting and expensive experiments.

3. The failure to admit that every application of past solutions to unstudied new and different conditions is an experiment.

4. The waste of time and money by the too eager systematizer on problems which will yield to scientific treatment, but which do not recur often enough to justify such a solution.

5. The undervaluing of effective leadership in management and consequent lack of permanency in results.

6. The overvaluing of emasculated system, leading to a curious non-responsibility on the part of any person for the total result.

7. The frequent assumption that the treatment of the problems of similar plants should be identical.

8. The failure to appraise properly the value to a growing concern of its internal asset of good will.

9. The imperfect analysis and appreciation of the human factor in industry, causing failure to reckon patiently with habit and inertia and a tendency to hasty substitution and the breaking up of valuable organizations.

These are all mistakes of men lacking tact, ability and experience, but full of enthusiasm for the new methods. Yet none of these failures weaken the case for the judicious application of the scientific method to the problems of industry, either directly by a sympathetic management or by competent counsel specially hired for the purpose.

But the difficulties encountered through temperamental and other defects in the agents used are not the only obstacles to be removed. The idea, assiduously fostered by the first professional systematizers, that valuable data on machine tool performance, which they alone possessed, were for sale, still prevails in the minds of the less progressive plant proprietors. The latter have sometimes sought to purchase just so much of the magic formulæ without attempting to understand the real nature of the service which the scientific method offers.

Such owners, sometimes under the influence of injudicious promises, have entertained extravagant expectations and have been correspondingly and unreasonably disappointed. There is perhaps no better service which a professional engineer of high standing could render than to circulate reports and information which will convince

plant owners and executives that the scientific method opens up no royal road to success, but is simply the most direct and reasonable course towards efficient control of industry and the guarantee of steady evolution in the same direction.

United States Rail Production 1912

Total Was 3,327,915 Gross Tons, Against 2,822,790 Tons in 1911 and 3,977,887 Tons in 1906, the Largest Year

The Bureau of Statistics of the American Iron and Steel Institute publishes the following statistics of the production of rails in the United States in 1912:

The production of all kinds of rails in the United States in 1912 amounted to 3,327,915 tons, against 2,822,790 tons in 1911, an increase of 505,125 tons, or over 17.8 per cent. Included in the total for 1912 are 174,004 tons of girder and high T steel rails for electric and street railroads, as compared with an output of 205,409 tons of similar rails in 1911.

Of the total production of rails in 1912 3,165,939 tons were rolled from Bessemer, open-hearth, and electric steel blooms or billets; 42,586 tons were rolled from new seconds, defective new rails, and steel crop ends; and 119,390 tons were rerolled from old steel rails or were renewed steel rails. No iron rails are reported for 1912. In the following table the production of all kinds of rails in 1912 is given by States in gross tons:

States—Gross tons. All kinds of rails.	Bessemer rails.	Open-hearth rails.	Electric, re-rolled steel, and iron.	Total.
New York, New Jersey and Md.	367,128	188,122	30,567	585,817
Pennsylvania	343,837	526,755	18,080	888,672
West Virginia, Alabama and Ohio	93	597,292	24,736	622,121
Indiana, Ill., Wis., Cal. and Wash.	388,868	792,975	49,462	1,231,305
Total for 1912.....	1,099,926	2,105,144	122,845	3,327,915
Total for 1911.....	1,053,420	1,676,923	92,447	2,822,790

Included in the 122,845 tons of rails rolled in 1912 and classified as electric and rerolled steel are 3455 tons of rails rolled from electric steel and 119,390 tons of renewed rails or rails rolled from old steel rails which the makers were unable to classify as Bessemer or open-hearth. Twenty-four works in 12 States rolled or rerolled rails in 1912, against 25 works in 11 States in 1911. The production of all kinds of rails by States is given in the following table from 1909 to 1912 in gross tons:

States—Gross tons. All kinds of rails.	1909.	1910.	1911.	1912.
New York, New Jersey and Md.	621,373	711,975	490,980	585,817
Pennsylvania	855,707	986,702	839,663	888,672
West Virginia, Alabama and Ohio	367,039	496,716	447,905	622,121
Ind., Ill., Wis., Cal., Wash., and Cal.	1,179,726	1,440,638	1,044,242	1,231,305
Total	3,023,845	3,636,031	2,822,790	3,327,915

Production of Bessemer Rails

The production of Bessemer rails in 1912 amounted to 1,099,926 tons, against 1,053,420 tons in 1911, an increase of 46,506 tons. Of the total in 1912 1,070,480 tons were rolled from ingots and 29,446 tons were rolled from new seconds, defective new rails, crop ends, etc. Illinois was the largest maker of Bessemer rails in each year from 1908 to 1912, but Pennsylvania was the largest maker in 1907. The maximum production of Bessemer rails was reached in 1906, when 3,791,450 tons were produced. The following table gives the production of Bessemer rails by States in gross tons from 1907 to 1912:

States.	1907.	1908.	1909.	1910.	1911.	1912.
N. Y., N. J. & Md.	1,054,480	386,730	586,193	568,353	284,230	367,128
Pennsylvania	1,093,932	315,547	553,719	591,473	352,331	343,837
West Va., Ga., Ala., Ohio, Ind. and Ill.	978,685	576,040	627,259 724,616 416,859 388,961			
Wis., Cal. and Wash.	252,928	70,836				
Total.....	3,380,025	1,349,153	1,767,171	1,884,442	1,033,420	1,099,926

Production of Open-Hearth and Electric Rails

The production of open-hearth rails in 1912 amounted to 2,105,144 tons, against 1,676,923 tons in 1911, an in-

crease of 428,221 tons, or over 25.5 per cent. Of the total in 1912 2,092,004 tons were rolled from ingots and 13,140 tons were rolled from new seconds, defective new rails, crop ends, etc. Almost all were rolled from basic steel. The maximum production was reached in 1912. The year of next largest production was 1910. The following table gives the production by States since 1907:

State—Gross tons.	1907.	1908.	1909.	1910.	1911.	1912.
N. Y. N. J.	37,023	184,059	335,856	445,139	579,924	712,056
Pa. and Va.	152,163	251,956	344,842	570,878	509,950	600,113
Ind. Ill. Wis.	63,518	135,776	575,976	735,342	587,049	792,975
Cal. & Colo.	252,704	571,791	1,256,674	1,751,359	1,676,923	2,105,144

It will be noticed that the production of open-hearth rails in 1912 was almost twice that of Bessemer rails in the same year.

In 1912 the production of rails rolled from steel made in electric furnaces amount to 3455 tons, as compared with 462 tons in 1911. In 1909 and 1910 small quantities of rails were also rolled from electric steel, but these rails were included with the Bessemer and open-hearth rails reported for these years.

Production of Alloy Steel Rails

Included in the figures for steel rails rolled in 1912 are 149,267 tons of alloy rails, against 153,989 tons in 1911. The following table gives the production of titanium, manganese, and other alloy steel rails by processes from 1909 to 1912:

Alloy rails—Gross tons.	Bessemer.	Open-hearth and electric.	Total.
Titanium steel rails.....	103,941	37,832	141,773
Manganese, copper and nickel.....	4,933	2,561	7,494
Total for 1912.....	108,874	40,393	149,267
Total for 1911.....	115,450	38,539	153,989
Total for 1910.....	229,935	27,389	257,324
Total for 1909.....	35,699	13,696	49,395

In the following table the production of titanium, manganese and other alloy steel rails is given by kinds since 1909:

Alloy rails—Gross tons.	1909.	1910.	1911.	1912.
Titanium steel rails.....	35,945	256,759	152,990	141,773
Manganese, copper, nickel, etc.....	13,450	565	999	7,494
Total.....	49,395	257,324	153,989	149,267

Production of All Kinds of Rails by Processes

In the following table the production of all kinds of rails from 1906 to 1912 is given by processes. Of the total production of rails in 1912 about 33.05 per cent. were rolled from Bessemer steel, about 63.25 per cent. were rolled from acid and basic open-hearth steel, and about 3.70 per cent. were rolled from electric steel and from old steel rails. As previously stated no iron rails were rolled in 1912.

Years—Gross tons.	Bessemer.	Open-hearth.	Iron and all other.	Total.
1906.....	3,791,459	186,413	15	3,977,887
1907.....	3,380,025	252,704	925	3,633,654
1908.....	1,349,153	571,791	71	1,921,015
1909.....	1,767,171	1,256,674	.....	3,023,845
1910.....	1,884,442	1,751,359	230	3,636,031
1911.....	1,053,420	1,676,923	92,447	2,822,790
1912.....	1,099,926	2,105,144	122,845	3,327,915

Rail Production and Consumption

The annual consumption of rails in the United States is approximately ascertained by adding the quantity imported to the total production and deducting the quantity exported. The following table gives the approximate consumption, in gross tons, of all kinds of rails from 1906 to 1912:

Years.	Production—Gross tons.		Add	Deduct	Approximate	
Gross tons.	Iron.	Steel.	imports.	exports.	consumption.	
1906.....		3,977,872	3,977,887	4,943	328,036	3,654,794
1907.....	925	3,632,729	3,633,654	3,752	338,906	3,298,500
1908.....	71	1,920,944	1,921,015	1,719	196,510	1,726,224
1909.....		3,023,845	3,023,845	1,542	299,540	2,725,847
1910.....	230	3,635,801	3,636,031	7,861	353,180	3,290,712
1911.....	234	2,822,556	2,822,790	3,414	420,874	2,405,330
1912.....		3,327,915	3,327,915	3,780	446,473	2,885,222

Weight of All Kinds of Rails from 1906 to 1912

The following table gives the production of all kinds of rails from 1906 to 1912 according to the weight of the rails per yard. Girder and high T steel rails for electric and street railroads are included in the total. The maxi-

mum production of rails was reached in 1906. The year of next largest production was 1910:

Years—Gross tons.	Under 45 lb. per yard.	45 lb. and less than 85 lb. per yard.	85 lb. and over per yard.	Total.
1906.....	284,612	1,749,650	1,943,625	3,977,887
1907.....	295,838	1,569,985	1,767,831	3,633,654
1908.....	183,869	687,632	1,049,514	1,921,015
1909.....	255,726	1,024,856	1,743,263	3,023,845
1910.....	260,709	1,275,339	2,099,983	3,636,031
1911.....	218,758	1,067,696	1,536,336	2,822,790
1912.....	248,672	1,118,592	1,960,651	3,327,915

Weight Per Yard of All Kinds of Rails

The following table gives the production of all kinds of rails in 1912, classified according to their weight per yard:

Kinds of rails—Gross tons.	Under 45 lb. per yard.	45 lb. and less than 85 lb. per yard.	85 lb. and over per yard.	Total.
Open-hearth steel rails.....	75,203	488,695	1,541,246	2,105,144
Bessemer steel rails.....	103,826	591,744	404,356	1,099,926
Electric and other steel rails.....	69,643	38,153	15,049	122,845
Iron rails.....	None	None	None	None
Total for 1912.....	248,672	1,118,592	1,960,651	3,327,915
Total for 1911.....	218,758	1,067,696	1,536,336	2,822,790

In 1912 over 41 per cent. of the rails weighing less than 45 lb. to the yard, nearly 53 per cent. of the rails weighing 45 lb. and less than 85 lb., and over 20 per cent. of the rails weighing over 85 lb. were rolled from Bessemer steel, while in the same year over 30 per cent. of the rails weighing less than 45 lb. per yard, over 43 per cent. of the rails weighing 45 lb. and less than 85 lb., and over 78 per cent. of the rails weighing 85 lb. and over were rolled from open-hearth steel.

Prices of Manganese Ore

The Carnegie Steel Company, Pittsburgh, has sent out a schedule of prices to be paid per ton of 2240 lb. for domestic manganese ore, delivered at Lucy furnaces, Pittsburgh; Edgar Thomson furnaces, Bessemer, or at the South works of the Illinois Steel Company, South Chicago, as follows:

For ore containing above 49 per cent. metallic manganese, 25c. per unit; 46 to 49 per cent., 24c. per unit; 43 to 46 per cent., 23c. per unit; 40 to 43 per cent., 22c. per unit. [This is a reduction of 1c. per unit from the last schedule issued.]

Prices are based on ores containing not more than 8 per cent. silica, not more than 0.20 per cent. phosphorus, and are subject to deductions as follows: For each 1 per cent. in excess of 8 per cent. silica, a deduction of 15c. per ton, fractions in proportion; for each 0.02 per cent., or fraction thereof, in excess of 0.20 per cent. phosphorus, a deduction of 2c. per unit of manganese per ton. Ore containing less than 40 per cent. manganese, or more than 12 per cent. silica, or 0.225 per cent. phosphorus, subject to acceptance or refusal, buyer's option.

Settlements are based on analysis of sample dried at 212 deg. F.; the percentage of moisture in the sample as taken to be deducted from the weight. Prices subject to change without notice, unless otherwise specially agreed upon.

Proposed Addition to Pig-Iron Capacity

In addition to the United States Steel Corporation improvements for which appropriations have been made consideration has been given to providing additional blast furnace capacity at Gary, Ind., and Lorain, Ohio. Plans have been discussed for two blast furnaces at Gary, but action may be deferred for some time, particularly in view of the two furnaces at Duluth, in connection with the new steel plant there, which are likely to be completed this year.

A book of practical value to every firm engaged in the export trade or planning to enter the foreign field has just been issued by the Bureau of Foreign and Domestic Commerce, Washington, D. C. It deals with a much-discussed subject—the credit problem—but presents it in a new way. It gives the general factors and principles involved and definite data of immediate practical value. It presents no ready-made solution for the credit problem; rather it sets forth the facts and outlines the principles that should govern foreign credit dealings. Copies of the book (Special Agents Series No. 62) may be obtained upon application to the Superintendent of Documents, Government Printing Office, for 30c. a copy.

ESTABLISHED 1855

THE IRON AGE

Published Every Thursday by the

David Williams Company
239 West 39th Street New York

W. H. Taylor - *President and Treasurer*
I. A. Mekeel - *First Vice-President*
Fritz J. Frank - *Secretary*
M. C. Robbins - *General Manager*

Editors

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Charles S. Baur - *Advertising Manager*

Branch Offices

Chicago: Otis Building Philadelphia: Real Estate Trust Bldg.
Pittsburgh: Park Building Cleveland: American Trust Building
Boston: Compton Building Cincinnati: Mercantile Library Bldg.

Entered at the New York Post Office as Second-class Mail Matter

Subscription price: United States and Mexico, \$5.00 per year; to Canada, \$7.50 per year; to other foreign countries, \$10.00 per year.

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The Rail Statistics

The production of Bessemer steel rails in the United States in 1912 showed an increase of 46,506 tons over 1911, while the production of open-hearth rails increased 428,221 tons. It was in 1911 that the production of open-hearth rails first exceeded that of Bessemer, while in 1912 the proportions were 34 per cent. Bessemer and 66 per cent. open-hearth. Only five years earlier, in 1907, the proportions had been 93 per cent. Bessemer and 7 per cent. open-hearth.

It is a remarkable fact that in so short a time the American steel industry should become prepared to produce so large a tonnage of open-hearth rails, for it takes time to build a rail mill. The open-hearth capacity has been supplied chiefly by interests which were already producing Bessemer rails, and when it is observed that the production of Bessemer rails in 1912 was only 29 per cent. of the production in 1906, the record year, it is evident that much Bessemer capacity has been thrown idle by the change. This was an economic loss, and it was borne chiefly by the interests which have lately created open-hearth rail making capacity.

There are those who still doubt whether the open-hearth rail is as much superior to the Bessemer rail as is held in some quarters. Considering that market prices have involved a premium of \$2 a ton for open-hearth rails over Bessemer, the railroads must have been fairly well convinced of the superiority of the open-hearth process, or they have invested their \$2 a ton merely in a chance. At any rate it has been more than a fad.

It is well to reflect in this connection that nothing is final in the manufacture of steel. It is not unalterably written that methods for the manufacture of Bessemer steel cannot be improved. The problem of the inventor, sometimes greater than the problem of becoming an inventor, is that of enlisting capital to try the invention. The invention may be good but it may be difficult to draw capital from its coffers to be sunk in the invention. To one who may invent a process for improving Bessemer steel there rises up no such obstacle. The capital is already invested, and the function of the invention would be, not to put capital into plant, but to draw it out.

The extremely rapid trend in demand toward the open-hearth rail undoubtedly rests upon a solid foundation, but it does not follow that the Bessemer rail is wholly bad, or that it is so nearly bad that there is no room for any argument. In the two years 1911 and 1912 more open-hearth rails were made than in all the past, which indicates conclusively that nothing like an exhaustive test as to durability, under all conditions, has been furnished. Bessemer rails, on the other hand, have stood up under adverse conditions which can be corrected. A large tonnage is in track and rendering service, of lighter sections than would now be put down, considering the heavier loads and greater speeds of recent years, while there have been improvements in section in late years of which the earlier rails did not have the benefit. There is a very large tonnage of Bessemer rails in service to-day, some of them quite old, and evidently they are giving good service. The rail tonnage in service was estimated quite closely in *The Iron Age* of October 24, 1912, which indicated that to the beginning of 1912 the total supply of rails to the United States had been about 63,000,000 tons, while about 53,000,000 tons of rails were in service,

leaving about 10,000,000 tons which had been replaced. To this statement it may now be added that only about 4,000,000 tons of those 53,000,000 tons were open-hearth rails, so that we have close to 50,000,000 tons of Bessemer rails in service to-day. The major part of those rails are more than ten years old. The frequently heard statement that rails last only seven years, or some such period, is an absurd generalization. There are places where the density of traffic is such that rails last only seven years. Also, there are places at which railroad engineers would be very glad to see a standard rail last seven months.

Rail production in the past two years has been as follows, in gross tons:

	1911.	1912.
Bessemer	1,053,420	1,099,926
Open-hearth	1,676,923	2,105,144
Electric	462	3,455
Iron	234	.....
Re-rolled, etc.	91,751	119,390
Total	2,822,790	3,327,915

It is natural enough that the mills which re-rolled or renewed rails, furnishing the last item in the above table, should not be able, or should not take the trouble, to maintain records showing whether the steel was Bessemer or open-hearth, and in any event a segregation in this item is not important. The only question that might arise is whether the re-rolling of an old rail into a rail should be included in "the production of rails."

The banner year for rail production was 1906, with 3,977,887 tons, from which the 1912 production falls short by 16 per cent., although rail requirements had six years in which to grow. It is a question whether even in this year the 1906 record will be broken, a fact which directs attention to the relatively small rate both of railroad building and of rail replacement through wear. The very moderate rate of rail replacement points to considerable longevity for the average rail, seeing that more than 50,000,000 tons are now in service.

A Steady Market for Steel Making Pig Iron

At Pittsburgh this week figures were given out by an important pig iron selling firm showing that the average price of Bessemer iron in February was \$17.25 and of basic \$16.317 at Valley furnace. The average price of Bessemer in December, 1912, was \$17.29 and of basic \$16.44, showing a decline in Bessemer of only 4 cents and in basic of 13 cents in two months. So far this year there has been no new demand for Bessemer iron and very little for basic, a sale of 1500 tons of the latter being practically all that was reported in February. Output has been maintained at an enormous rate, nearly every available furnace in the Pittsburgh and the Valley districts being in operation. That prices have been practically stationary in the face of a lifeless demand is unusual, but is explained by the fact that in the latter part of last year the merchant Valley furnaces sold heavily for delivery in the first quarter, and in some cases into the second quarter of this year, and consumers have been taking out their iron very promptly, some of them asking the furnaces to anticipate shipments. The slump in prices of prompt coke from \$4.25 in December to \$2.50 or lower in the last week in February, had no effect on prices of Bessemer or basic iron, nor have the low prices on scrap which have been ruling in the Pittsburgh market for some months. Valley foundry iron, however, has receded

recently about 50 cents a ton, due to the starting of additional capacity that was not supplied with orders ahead.

As to the course of prices on Bessemer and basic in the near future definite indications are lacking. A brisk buying movement in basic is looked for this month; if this develops, prices may show some betterment. Furnaces point out that consumption is at a record rate and that as long as this continues prices are not likely to decline to any great extent. On the other hand, consumers insist that the heavy output of merchant iron, added to the high rate at which steel works furnaces are operating, tends to a condition in which supply will be greater than the demand.

The statistics of production throw little light on the balance existing between production and consumption of steel making pig iron in the Pittsburgh and tributary districts. In September the blast furnaces in the four districts designated in our pig iron statistics as Western Pennsylvania, Pittsburgh district, Shenango Valley and Mahoning Valley, produced 35,178 tons a day or 42.8 per cent of the production of the country (leaving out charcoal iron). In January the four districts named produced 38,758 tons a day, or 42.9 per cent of the production of the country. The ratio was thus substantially unchanged in the four months with no indication that merchant furnaces will be called on to an increasing extent to reinforce the pig iron output of the steel companies, except such as is furnished by the shipment of pig iron from furnaces of the Carnegie Steel Company to help out a shortage in the Chicago district. The amount of this movement is not such, however, as to make any particular impression on the merchant pig iron market.

The Banker and the Business Man

In some banking circles the hope appears to prevail that the activity in manufacturing may subside to some extent. It is given expression in a published statement by a New England bank as follows: "The volume of business can drop quite a little from its present high level without bringing any bad effects, and such a drop would ease up the money situation and make it possible for large concerns to go ahead with much needed addition and improvements."

This is a peculiar view to take of the business situation. It is true that the greater the activity in business the greater the demand for money, and this demand may become sufficiently great to make it difficult for new undertakings or extensions of old ones to be financed. But it is also true that a much stronger disposition is shown by manufacturers to enlarge their facilities and expand their activities in a time of extraordinary demand for their products than when their trade is declining.

Banking interests may desire some let-up in business activity because a few of their clients who need more capital are unable to get it at this time, but they are likely to find that if the let-up occurs those clients will undergo a change of heart and be less disposed to seek money for enlargements. The demand for money is very much like the demand for pig iron or any other commodity. In a time of excessive consumption the pig iron melter is free to express his intention to buy a supply if the seller would make some concession. Let the seller make the concession, however, and the melter at once changes his views and decides to defer the proposed purchase.

Annual Reports Are Cheerful Reading

Annual reports of manufacturing companies for 1912 are now coming out rapidly and the great majority of them make a much more agreeable showing than did the reports for 1911. Notwithstanding the fact that in the early months of 1912 financial results were rather unfavorable, as operations were at considerably less than capacity and prices were so low as to leave little or no profit, the great increase in business in the remaining months of the year more than overcame these unsatisfactory conditions. Without exception, the reports show large orders in hand and the executive officers express their belief that 1913 will prove to be another prosperous year.

It is a rather remarkable fact that so far none of the reports coming to hand has expressed the fear that adversity may develop from the expected revision of the tariff. Possibly the feeling is entertained that it would be unwise to anticipate anything of such a character, but the unanimity with which this matter is disregarded is noteworthy. Those who venture to make any predictions regarding the course of business in the latter half of the year dwell with more force on the probable influence of good or bad crops than on anything else.

A Good Cabinet Appointment

President Wilson's appointment of William C. Redfield as Secretary of Commerce will be received with much satisfaction by those engaged in manufacturing and commercial pursuits. Mr. Redfield has had such a wide experience in manufacturing, has not only conducted a large trade in this country but also with foreign countries, and has enjoyed opportunities through travel to become acquainted with conditions abroad, and is further so well equipped by education and natural ability to express himself clearly and forcibly on public questions that he is exceptionally well qualified to fill the important position to which he has been named as one of the President's advisers. The manufacturers and merchants of the country will probably look to him more than to any other member of the Cabinet to see that the material interests of this country are promoted vigorously during the new National Administration.

Systematized Care of Belting

The organized care of belting in manufacturing establishments is a valuable element of economical management. Ordinarily belting is looked after in a somewhat hap-hazard way. A break is repaired, or an exaggerated case of slack is remedied. But there is no systematized watchfulness. Experience shows that this form of neglect is expensive. Belts should be subjected to regular inspection. In one large plant one man is given charge of this work, and has become an expert. At least once in six months each belt is put in perfect repair. The length, the speed, the cross section and the tension are ascertained and the necessary adjustment is made to procure a standard tension. Every belt in the works has its symbol and its record is kept with great care. Slips are furnished the inspector, who fills one out for each task performed, that the complete facts and the cost entailed may be charged to the belt record and the proper cost sheet. The slip contains blanks for the belt symbol, the

length of belt, and the maximum and minimum tension; when cleaned and greased and the grease used; when dressed while in use and the dressing used; the amount taken out or the length put in; the length of splice and the cement used; and the tension in pounds indicated by each spring balance, before tightening and after. These facts entered periodically in the record of a belt give its exact history, which becomes a valuable guide for future buying. At the same time the constant attention insures that each belt is doing its work with an extreme of efficiency and a minimum of depreciation.

Correspondence

Standard Tapers for Safety Shape Emery Wheels

To the Editor: The standardizing of shapes for emery wheels and steel safety collars is a serious question, demanding immediate attention by consumers and makers of grinding wheels. Unless a standard is adopted and complied with the use of these collars and safety shape wheels will become more dangerous than safe and result in considerable loss of life and property.

The writer has been in close personal touch with the development of this practice for many years, and it is the recent acknowledgment by the general trade along with the recognition by factory inspectors in most of the States that has forced the use of this type of wheel. There are many concerns using wheels who have recently undertaken to make their own safety collars, several of whom have made them to a shape of their own which was not in conformity with any of the standards on the market, and some manufacturers of wheels have been willing to conform their wheel to any shape. This should be stopped immediately.

The Pittsburgh Emery Wheel Company has shipped many thousand dollars worth of collars, all with $\frac{3}{4}$ -in. taper to the foot, the wheels being tapered on both sides. Many of these collars were shipped with a 6-in. flat spot at the center. This has been changed to 4-in. flat spot in the collars, and all wheels are shipped with a 6-in. flat spot.

The Safety Emery Wheel Company has shipped many thousand dollars worth of collars and has placed many of them on the market, $1\frac{1}{2}$ -in. taper to the foot with a 4-in. flat spot, but some years ago changed the taper to $\frac{3}{4}$ in. to the foot with a 4-in. flat spot.

The Carborundum Company has put out its collars, as the writer understands it, with $\frac{3}{4}$ -in. taper to the foot, some of 4-in. and some of 6-in. flat spot, furnishing wheels flat on one side and tapered accordingly on the other.

In the use of the $\frac{1}{2}$ -in. taper, the writer has known a number of instances where a wheel has broken and a large piece of the wheel gotten away from the collars, injuring or killing the operator or producing property damage, or both. In the use of collars and wheels where the latter are tapered on both sides, using $\frac{3}{4}$ -in. taper to the foot, where the wheels and collars fit each other, and where the collars are within 4 in. in diameter less than the wheel, there have been practically no casualties or serious damage, since the adoption of this taper about ten years ago.

By clamping a wheel with a $\frac{3}{4}$ -in. taper to its sides into a pair of collars with $\frac{1}{2}$ -in. taper, nearly every wheel will break, and the pieces of the wheel will fly, as the collars will be open at the rim. But a wheel with $\frac{1}{2}$ -in. tapered sides will not necessarily break if used in collars with $\frac{3}{4}$ -in. taper, but a constant use of $\frac{1}{2}$ -in. tapered wheels and $\frac{3}{4}$ -in. tapered collars will ruin the collars in time for use with $\frac{3}{4}$ -in. tapered wheels, as the tightening of the nut on the spindle will spring the collars at the center. Where more than 2 in. of the wheel is to be exposed beyond the safety collar, a safety hood should be mounted on a machine, in addition to the collars, in all cases.

If all manufacturers of wheels will ship their wheels with 4-in. taper to the foot with 6½-in. flat spot, and make all collars for wheels ¾ in. taper to the foot with a 4-in. flat spot, and if all consumers of emery wheels who make their own collars will make them ¾-in. taper to the foot with a 4-in. flat spot, there will be no cause for further trouble. The condition should apply to wheels more than 12 in. in diameter.

In places where wheels 12 in. and under in diameter are used (this would not apply to 12-in. stubs of larger wheels that are used in the same grinding room) we shall in the future adopt a 3-in. flat spot, thereby enabling collars 6 in. in diameter to be used, and allowing sufficient hold on the tapered sides of the wheels when partly worn out. If the trade will give this matter sufficient attention and insist on getting all their wheels with ¾-in. taper to the foot and 6-in. flat spots, they will save themselves considerable trouble and bring about a standard with the least possible confusion.

CHARLES G. SMITH,

President Pittsburgh Emery Wheel Company.

PITTSBURGH, March 3, 1913.

The Foundry Exhibition at Chicago

Secretary C. E. Hoyt, of the Foundry & Machine Exhibition Company, in announcing the exhibition to be held in Chicago in October, says that the registration of foundrymen's conventions has shown that the majority of visitors come from manufacturing foundries rather than jobbing foundries and they are interested in seeing machines used in metal working departments as well as equipment for foundries. It is expected, therefore, that a considerable number of builders of metal working machines will make exhibits. The plan now is to hold the exhibition from October 10 to October 17, while the conventions of the allied foundrymen's associations will be held in the week beginning October 13. The International Amphitheater in which the exhibition will be held has more than two acres of floor space under cover. Switching tracks run into the buildings and the work of unloading and installation is made easy. The International Refrigeration Congress will have an exhibition in the same building just prior to the foundry exhibition.

Progress on Midland Open-Hearth Steel Plant

Owing to the favorable weather, fast progress has been made on the building of the new open-hearth steel plant of the Pittsburgh Crucible Steel Company at Midland, Pa., and it is expected to be ready for operation early in June. It will have eight 75-ton open-hearth furnaces, with provision for two more; four five-hole soaking pit furnaces, with a capacity of eight ingots to a hole; a 45-in. blooming and billet mill of the Mackintosh-Hemphill type; a continuous merchant bar mill of the Morgan type; and a 22-in. reversing bar mill to be driven by a William Tod engine. The product of the last named mill is to be 2 to 8 in. rounds, including steel car axles. There are 240 coke ovens at Midland, some of which were put in operation early in the year, but these have since been closed down, the company now buying all the coke needed for its Midland blast furnace in the open market.

The Republic Iron & Steel Company, Youngstown, Ohio, expects to start up about March 15 its new 8 and 10-in. combination mills under erection for some time at its Brown-Bonnell plant. The new mills will roll small rounds and flats. The company is also building a 12-in. mill to make larger shapes, rounds and flats, which will be ready for operation about April 1. Two other mills, 16 and 20-in., are being added. All these mills are in one building, which is 800 ft. long by 184 ft. wide.

The Harrisburg Pipe & Pipe Bending Company, Harrisburg, Pa., is about to install equipment for cutting to length forging billets of larger section than at present handled. For some time the company has been marketing a larger portion of its steel in specialties, particularly for the automobile trade, and has given less attention to the manufacture of pipe. The intention is not to discontinue wholly the manufacture of pipe, and it will be resumed whenever conditions in the trade are more satisfactory.

Harvester Company Called Monopolistic

WASHINGTON, March 3, 1913.—The report of the Bureau of Corporations on the International Harvester Company, following an investigation of almost five years, sets forth that the company is a monopolistic combination, that it has certain unfair competitive methods and has superior command of capital. In summarizing the objectionable competitive methods of the company the report names the following:

1. Maintenance of bogus independent companies in the early years of the company's operation.
2. Attempts to force dealers carrying its harvesting machines into carrying additional lines or certain International lines exclusively. At an earlier date the contracts of the Harvester company contained an exclusive clause for harvesting machines.
3. Efforts to secure an undue proportion of desirable dealers in a given town by giving only one of its several brands of harvesting machines to a dealer, thus tending to restrict the outlet for competitive goods.
4. Use of "suggested price" lists, tending to influence the final retail price; earlier the contracts themselves provided for fixing of retail prices by the company.
5. Occasional discrimination in prices and terms.
6. Misrepresentations by salesmen regarding competitors, particularly that patrons of other makers would not be able to secure repair parts.

Cyrus H. McCormick, president of the International Harvester Company, in a published statement says that the making of this report by the Bureau of Corporations, while the Government's suit for dissolution is pending and within two days of the beginning of the evidence of the company, is unfair. He emphasizes the fact that the report justifies the company in the fundamental matters of honest capitalization, moderate profits and fair prices, and adds that the Bureau nails the old falsehood that the International Harvester Company sells abroad cheaper than it sells at home. The statement of the report on this point was this: "Generally speaking, the prices obtained by the company on foreign sales are relatively higher than those in the domestic market, but claims made by the company that the net return is invariably greater were not sustained by its records; in some important instances at least the foreign nettings were lower than the domestic."

Mr. McCormick directs attention to the concession in the report that the company was formed to bring about the most economical production. "Harvesting machines," he says, "are the cheapest things the farmer buys. While the report exaggerates and criticises the company's financial resources, it admits that these are necessary to economical manufacture on a large scale."

The United States District Court at New York issued a decree March 4 ordering the dissolution of the American Coal Products Company, of which the principal member is the Barrett Mfg. Company. A suit under the Sherman law was filed against it by the Government on Monday, and the defendants consented to a decree, though they denied that they had been engaged in the restraint of trade. They wished, they said, to avoid a long and expensive litigation, even if they believed that none of their acts was illegal. The decree declared the American Coal Products Company unlawful, and it restrained the Barrett Mfg. Company from a long list of acts, all of which would tend to the monopolization of the coal tar and oil tar industry.

The 1913 analysis book of E. N. Breitung & Co., Rockefeller Building, Cleveland, Ohio, gives the guaranteed analyses of the Old Range Lake Superior iron ores to be handled by this firm in 1913. Eighteen ores are given, all from the Marquette Range except the Algoma ore (Bessemer), which is mined on the Michipocoten Range by the Breitung Iron Company of Canada, and the Randville ore (silicious), which is mined on the Menominee Range by the Juliet Mining Company. The Algoma is a silicious ore and at 212 deg. F. shows 44.20 per cent. iron, 0.033 per cent. phosphorous and 34.47 per cent. silica.

The Carnegie Steel Company has taken a contract for 1900 tons of 12½-in. sheet steel piling for the building of a lock at Troy, N. Y., which connects the Barge Canal with the Hudson River.

Increasing Pig-Iron Output

A Gain of Five Furnaces in February

Active Capacity March 1 Is 1758 Tons a Day More than on February 1

Our statistics of pig-iron production in February show a total of 2,586,337 gross tons of coke and anthracite iron for the 28 days, or 92,369 tons a day, against 2,795,331 tons or 90,172 tons a day in January. Nine furnaces were blown in last month and four were blown out, making a net gain of five. On March 1 303 furnaces were in blast, with a daily capacity of 93,086 tons, against 298 furnaces and 91,328 tons daily capacity on February 1. The gain in merchant furnace output last month is noteworthy, being over 2100 tons a day against less than 100 tons for steel works furnaces. At the beginning of this month pig-iron production, including charcoal iron, was at the astonishing rate of 34,350,000 tons a year.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from February, 1912, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons.			
	Steel works.	Merchant.	Total.
February, 1912	57,382	18,960	72,442
March	58,561	18,630	77,591
April	61,024	18,157	79,181
May	62,018	19,033	81,051
June	60,799	20,559	81,358
July	58,158	19,570	77,728
August	59,464	21,582	81,046
September	59,102	23,026	82,128
October	62,820	23,952	86,772
November	62,817	24,878	87,695
December	63,770	25,996	89,766
January, 1913	63,921	26,251	90,172
February	64,005	28,364	92,369

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces in February and the four months preceding.

	Monthly Pig-Iron Production—Gross Tons.				
	Oct. (31 days)	Nov. (30 days)	Dec. (31 days)	Jan. (31 days)	Feb. (28 days)
New York	179,726	169,677	184,899	188,943	180,789
New Jersey	5,370	6,167	5,609	5,833	5,644
Lehigh Valley	87,182	94,831	91,393	99,470	93,552
Schuylkill Valley	78,440	78,413	80,513	80,223	65,362
Lower Susquehanna and Lebanon Val.	61,480	60,313	66,161	72,172	60,205
Pittsburgh district	621,813	567,868	626,688	626,118	569,457
Shenango Valley	143,115	133,819	149,404	152,065	145,464
Western Penn.	157,027	160,134	163,473	163,563	147,279
Maryland, Virginia and Kentucky	42,286	49,140	58,526	61,026	64,704
Wheeling district	118,034	114,632	124,708	111,595	114,979
Mahoning Valley	256,711	242,952	245,691	259,756	255,425
Central and North Ohio	237,506	236,198	246,666	246,709	208,832
Hocking Valley, Hanging Rock and S. W. Ohio	38,419	39,231	38,108	29,247	35,981
Chicago district	388,650	398,678	411,213	402,408	357,700
Mich., Minn., Mo., Wis., Col., Wash.	76,774	75,697	84,190	83,750	79,875
Alabama	160,834	167,408	171,090	180,790	164,642
Tennessee	36,566	35,696	34,405	31,863	30,457
Total	2,689,933	2,630,854	2,782,737	2,795,331	2,586,337

Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in these figures, together with ferromanganese, spiegeleisen and ferrosilicon. These last, while stated separately, are also included in the columns of "total production."

	Pig. Total production—			Spiegeleisen and ferromanganese		
	1911.	1912.	1913.	1911.	1912.	1913.
January	1,128,448	1,483,153	1,981,560	8,360	22,622	15,633
February	1,185,782	1,550,995	1,792,154	12,821	15,950	20,131
March	1,518,063	1,827,792	.....	11,784	11,538	.....
April	1,434,142	1,830,717	.....	10,657	11,104	.....
May	1,310,378	1,922,557	.....	13,641	20,518	.....
June	1,281,241	1,823,958	.....	22,611	26,685	.....
July	1,316,646	1,803,205	.....	17,067	26,522	.....
August	1,460,610	1,843,404	.....	14,579	24,225	.....
September	1,490,898	1,773,073	.....	17,757	22,484	.....
October	1,560,884	1,947,426	.....	19,697	27,252	.....
November	1,452,907	1,884,524	.....	19,678	17,461	.....
December	1,453,446	1,976,870	.....	20,068	18,523	.....

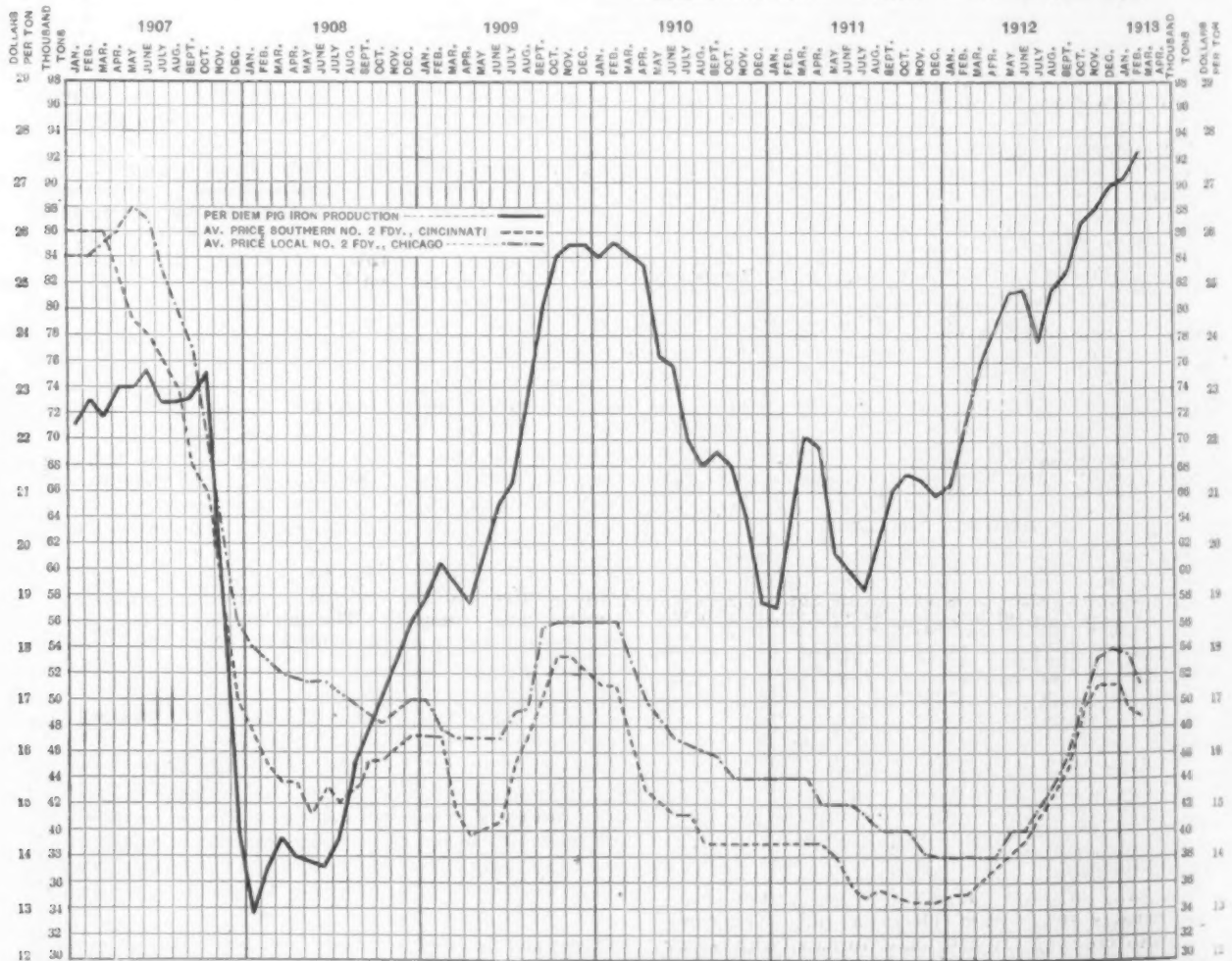


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from January 1, 1907, to March 1, 1913; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

Capacity in Blast March 1 and February 1

The following table shows the daily capacity, in gross tons, of furnaces in blast March 1 and February 1 by districts

Location of Furnaces	Coke and Anthracite Furnaces in Blast		Total		Feb. 1	
	Number of stacks	Number in blast	Number	Capacity per day	Number	Capacity per day
New York:						
Buffalo	19	18	5,856	17	5,680	
Other New York....	7	3	601	3	551	
New Jersey	7	2	352	1	181	
Pennsylvania:						
Lehigh Valley	22	15	3,313	14	3,192	
Southern	2	2	178	2	168	
Schenck Valley	16	10	2,553	9	2,370	
Lower Susquehanna....	7	6	1,325	5	1,156	
Shenango Valley	10	9	1,229	9	1,225	
Pittsburgh District ..	51	46	19,782	46	19,680	
Spring	3	3	541	3	330	
Shenango Valley	20	18	5,255	17	4,805	
Western Pennsylvania	27	19	5,350	19	5,254	
Maryland	4	3	827	3	812	
Wheeling District	14	11	4,106	11	3,730	
Ohio:						
Malouin Valley	24	23	9,122	23	9,184	
Central and Northern	24	20	7,458	21	7,958	
Hocking Val., Hanging						
Rock & S. W. Ohio....	15	9	1,305	8	1,055	
Illinois and Indiana....	34	32	12,755	32	12,981	
Spiegel	2	0	0	0	0	
Mich., Wis. and Minn....	10	9	1,850	9	1,863	
Colorado, Mo. and Wash	8	3	1,094	3	986	
The South:						
Virginia	23	7	977	8	1,005	
Kentucky	5	2	289	2	285	
Alabama	46	24	5,880	24	5,792	
Tennessee	20	9	1,088	9	1,047	
Total	420	303	93,086	298	91,328	

Changes in the active list in February included the blowing in of one Niagara furnace in the Buffalo district, Musconetcong, in New Jersey, one Bethlehem in the Lehigh Valley, Delaware River in eastern Pennsylvania, Lochiel in the Lower Susquehanna Valley, New Castle No. 4 in the Shenango Valley, Saxton in western Pennsylvania, Jisco in the Hanging Rock district, and one South Chicago in Illinois. Among furnaces blown out or banked (remaining so at the end of the month) were Marshall in western Pennsylvania, Dora in Virginia, one Central at Cleveland and one Gary in Indiana. Sharpsville furnace in the Shenango Valley blew out March 2.

Diagram of Pig-Iron Production and Prices

The fluctuations in pig-iron production from January, 1907, to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of *The Iron Age*. The figures for daily average production are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907—Gross Tons.									
	1907.	1908.	1909.	1910.	1911.	1912.	1913.		
January	71,149	33,918	57,975	84,148	56,752	66,384	90,172		
February	73,038	37,163	60,976	85,616	64,090	72,442	92,369		
March	71,821	39,619	59,232	84,459	70,036	77,591	.....	
April	73,885	38,289	57,962	82,792	68,836	79,181	.....	
May	74,048	37,603	60,753	77,102	61,079	81,051	.....	
June	74,486	36,444	64,656	75,516	59,585	81,358	.....	
July	72,763	39,287	67,793	69,303	57,841	77,738	.....	
August	72,594	42,851	72,546	67,963	62,150	81,046	.....	
September	72,783	47,300	79,507	68,476	65,903	82,128	.....	
October	75,386	50,554	83,856	67,520	67,811	86,772	.....	
November	60,937	51,595	84,917	63,659	66,648	87,695	.....	
December	39,815	56,158	85,022	57,349	65,912	89,766	.....	

The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1908—Gross Tons.						
	1908.	1909.	1910.	1911.	1912.	1913.
Jan.	1,045,250	1,797,560	2,608,605	1,759,326	2,057,911	2,795,331
Feb.	1,077,740	1,707,340	2,397,254	1,794,509	2,100,815	2,586,337
Mar.	1,228,204	1,832,194	2,617,949	2,171,111	2,405,318	.....
Apr.	1,149,602	1,738,877	2,483,763	2,064,086	2,375,436	.....
May	1,165,688	1,883,330	2,390,180	1,893,456	2,512,582	.....
June	1,092,131	1,930,866	2,265,478	1,787,566	2,440,745	.....
July	1,218,129	2,103,431	2,148,442	1,793,068	2,410,889	.....
Aug.	1,359,831	2,248,930	2,106,847	1,926,637	2,512,431	.....
Sept.	1,418,998	2,385,206	2,056,275	1,977,102	2,463,839	.....
Oct.	1,567,198	2,599,541	2,093,121	2,102,147	2,689,933	.....
Nov.	1,577,854	2,547,508	1,909,780	1,999,433	2,630,854	.....
Dec.	1,740,912	2,635,680	1,777,817	2,043,270	2,782,737	.....

The new open-hearth steel plant of the Youngstown Sheet & Tube Company at East Youngstown, Ohio, is approaching completion and is expected to be ready for operation early in April. It will have six 75-ton open-hearth furnaces and a 42-in. blooming mill. The company is also erecting a fourth blast furnace, with a capacity of 500 tons per day, which will be ready for operation about the same time as the open-hearth plant.

Blast Furnace Notes

Furnace A, of the Warwick Iron & Steel Company, Pottstown, Pa., was blown in February 27 after 12 days' idleness, for relining. This company now has two stacks, A and No. 2, active.

The Delaware River Steel Company, Chester, Pa., blew in its furnace last week, after making needed repairs.

Marshall furnace, of the Juniata Furnace & Foundry Company, Newport, Pa., has been blown out to make changes in the lining, which will reduce the diameter of the hearth.

The Republic Iron & Steel Company blew out its Hannah furnace March 3, for relining and repairs, and it will be idle for about six weeks.

The blast furnace of the Jackson Iron & Steel Company, Jackson, Ohio, which was blown out January 2 for relining, was blown in February 6.

Furnace D of the Central group of the American Steel & Wire Company at Cleveland was blown out February 2 and is now being relined.

The Cambria Steel Company's Year

The annual report of the Cambria Steel Company, setting forth the results of the fiscal year ended December 31, 1912, shows the earnings and production to have been as follows, compared with the preceding year:

Income Account.		1912.	1911.
Earnings		\$4,446,709	\$3,618,334
Less provision for extraordinary replacements and exhaustion of minerals.....		545,358	369,588
Net earnings.....		3,901,351	3,248,746
Fixed charges.....		490,268	471,407
Net income.....		3,411,083	2,777,339
Dividends		2,250,000	2,250,000
Surplus		1,161,083	527,339
General depreciation			150,003
Carried to profit and loss.....		1,161,083	377,339
Total profit and loss account.....		\$3,945,187	\$2,784,104
Production and Shipments.		1912.	1911.
Pig iron made	Gross tons.	972,758	767,499
Steel ingots made		1,382,650	973,457
Finished product shipped		1,038,634	656,382

The balance sheet as of December 31, 1912, shows quick assets of \$17,002,363.15; bills and accounts payable, \$4,559,697.72. It also shows that up to date the total surplus earnings of the company have been \$19,635,225.90.

The report sets forth the details of plant improvements made in 1912, which included three 75-ton open-hearth furnaces, a plant for briquetting fine ores and flue dust, 32 nail machines, etc. Improvements in sight will call for an expenditure of approximately \$5,000,000.

Large Locomotive Orders.—One of the largest locomotive orders in many months has been given to the Baldwin Locomotive Works by the Baltimore & Ohio Railroad, calling for 60 Mikado type and 30 Pacific type engines. The Pennsylvania Railroad has placed 170 locomotives at its Juniata shops at Altoona, Pa., filling them up for the entire year. The Missouri Pacific has ordered 12 locomotives from the American Locomotive Company. The Cincinnati, New Orleans & Texas Pacific has ordered 10 locomotives from the Baldwin Locomotive Works and 7 from the American Locomotive Company. The Detroit Terminal Railroad has ordered 5 switching locomotives from the latter company. The Burlington has bought 25 switching engines from the Baldwin Works.

At the monthly meeting of the Chicago Foundrymen's Club, to be held Saturday evening, March 8, at the Great Northern Hotel, John Whitman, superintendent of the House of Correction, Chicago, will speak concerning the modern methods for handling the youthful and street corner lawbreakers of the large cities. It is the intention of the club to devote several meetings this year to matters of general and civic interest, interspersing the usual discussions of topics directly connected with foundry practice.

The Cambria Steel Company has advanced the wages of common labor from 15c. to 17c. per hour, effective March 1.

The Iron and Metal Markets

More than 34,000,000 Tons

Astonishing Rate of Pig-Iron Output

Steel Works Specifications Heavier and Their Output Is at a Record Rate

The astounding rate at which pig-iron is now being produced, as shown by our March 1 blast furnace statistics, makes the question how long it can be maintained of first consequence. With a net gain of five furnaces in February the active capacity March 1 was 93,086 tons a day, which, estimating charcoal iron at 1000 tons a day additional means no less than 34,350,000 tons a year.

February pig-iron output was 2,586,337 tons, or 92,369 tons a day, against 90,172 tons a day in January. The February rate was thus 20,000 tons a day, or 7,300,000 tons a year more than that of February, 1912. The significant fact is that of the February increase 2100 tons a day was in merchant iron and only 100 tons a day in the output of steel works furnaces.

The increased make of pig-iron will bear watching for its effect on the foundry iron market, but it has little bearing yet on the steel situation which has long been independent of pig-iron. The steel companies seem to be near their limit in pig-iron output, the gains and losses in the active furnace list about balancing. In the near future the losses may be greater, as many furnaces have long been under hard driving.

Reports from the leading steel companies still take issue with the less hopeful sentiment that has been creeping into some portions of the trade. Specifications in February were in excess of shipments in both the Pittsburgh and Chicago districts. At the same time the output of steel mills is at the highest rate ever reached. March, like October, given fair weather conditions, is likely to bring new production records.

In the case of one of the largest steel companies specifications are in hand for 55 per cent. of the contracts on its books.

A Pittsburgh tube company having its own steel works has bought 6000 tons of billets to eke out. An Eastern steel company has sold 2000 tons for shipment to Pittsburgh. Recent sales of open-hearth rolling billets have been made at close to \$30 Pittsburgh.

The situation as to agricultural bar contracts for delivery after July 1 has not taken definite shape. The large buying last year was at 1.15c. Pittsburgh, which was full price at the time, but with the market rising the manufacturers accepted 12 months' deliveries at that rate. What form the concession, if any, will take this year remains to be seen. Bar mills are heavily booked, one large producer having its capacity practically taken for nine months ahead. Prompt steel bars are higher.

No important rail business is reported, though girder rails are still unusually active. Car orders will be less spectacular now that the builders are sold well into the last quarter. About 20,000 are now under

inquiry. Railroad bridge work has been coming up at a good rate.

Plate mills in the East can make prompter deliveries than of late—three weeks is now a possibility and the price is around 1.60c. Pittsburgh.

There is more inquiry in the pig-iron market and seller's are now looking for a March movement. As often happens after a wait, prices are declining as the chance of business grows. In Virginia, pipe iron sales of 10,000 to 15,000 tons have been made, \$15 at furnace for No. 3 being shaded. On foundry iron lower prices have appeared in Eastern and Central Western markets, but buyers are deliberate. Consumption holds up well, but the foundry labor situation is unsettled in spots.

Basic iron gives signs of life which are overdue. For Maryland delivery several thousand tons was taken in the Central West at close to \$17.25 at buyer's works. In Eastern Pennsylvania, where \$18 has long been the nominal price, \$17.50 can now be done.

Quieter conditions in the German, Belgian and British markets are more pronounced. German prices are weakening in spots. A sign of recession there is the fact that more Swedish iron ore is now being offered in the United States.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month and one year previous.

	Mar. 5, 1913.	Feb. 26, 1913.	Feb. 5, 1912.	1912.
Pig Iron, Per Gross Ton:	1913.	1913.	1913.	1912.
Foundry No. 2 X, Philadelphia.	\$17.80	\$18.00	\$18.50	\$14.85
Foundry No. 2, Valley furnace	17.00	17.00	17.50	13.00
Foundry No. 2, S'th'n. Cin'ti.	16.50	16.50	16.75	13.50
Foundry No. 2, Birmingham, Ala.	13.25	13.25	13.50	10.25
Foundry No. 2, furnace, Chicago*	17.25	17.25	17.50	14.00
Basic, delivered, eastern Pa.	18.00	18.00	18.00	14.25
Basic, Valley furnace	16.25	16.25	16.35	12.40
Bessemer, Pittsburgh	18.15	18.15	18.15	14.90
Malleable Bessemer, Chicago*	17.25	17.25	17.50	14.00
Gray forge, Pittsburgh	17.15	17.15	17.15	13.40
Lake Superior charcoal, Chicago	18.00	18.00	18.00	15.75

Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh	28.50	28.50	28.50	20.00
Open hearth billets, Pittsburgh	29.00	29.00	29.00	19.50
Forging billets, Pittsburgh	36.00	36.00	36.00	26.50
Open hearth billets, Philadelphia	32.00	32.00	32.00	22.40
Wire rods, Pittsburgh	30.00	30.00	30.00	25.00

Old Material, Per Gross Ton:				
Iron rails, Chicago	16.25	16.25	16.25	15.00
Iron rails, Philadelphia	18.00	18.00	18.00	15.50
Car wheels, Chicago	16.75	16.75	16.75	13.00
Car wheels, Philadelphia	15.00	15.00	16.00	11.75
Heavy steel scrap, Pittsburgh	14.00	14.00	14.50	12.00
Heavy steel scrap, Chicago	12.00	12.00	12.00	10.50
Heavy steel scrap, Philadelphia	12.50	12.50	13.50	11.50

Finished Iron and Steel,				
Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.67½	1.67½	1.67½	1.25
Iron bars, Pittsburgh	1.70	1.70	1.70	1.25
Iron bars, Chicago	1.57½	1.57½	1.60	1.15
Steel bars, Pittsburgh, future	1.40	1.40	1.40	1.10
Steel bars, Pittsburgh, prompt	1.85	1.70	1.70	1.10
Steel bars, New York, future	1.56	1.56	1.56	1.26
Steel bars, New York, prompt	2.01	1.86	1.86	1.26
Tank plates, Pittsburgh, future	1.45	1.45	1.50	1.10
Tank plates, Pittsburgh, prompt	1.70	1.70	1.75	1.10
Tank plates, New York, future	1.61	1.61	1.66	1.26
Tank plates, New York, prompt	1.76	1.86	1.91	1.26
Beams, Pittsburgh, future	1.45	1.45	1.50	1.15
Beams, Pittsburgh, prompt	1.70	1.70	1.75	1.15
Beams, New York, future	1.61	1.61	1.66	1.31
Beams, New York, prompt	1.86	1.86	1.91	1.31
Angles, Pittsburgh, future	1.45	1.45	1.50	1.15
Angles, Pittsburgh, prompt	1.70	1.70	1.75	1.15
Angles, New York, future	1.61	1.61	1.66	1.31
Angles, New York, prompt	1.86	1.86	1.91	1.31
Skelp, grooved steel, Pittsburgh	1.45	1.45	1.45	1.10
Skelp, sheared steel, Pittsburgh	1.50	1.50	1.50	1.15
Steel hoops, Pittsburgh	1.60	1.60	1.60	1.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Mar. 5, Feb. 26, Feb. 5, Mar. 6,			
	1913.	1913.	1913.	1912.
Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	2.35	2.35	2.35	1.80
Wire nails, Pittsburgh	1.75	1.75	1.75	1.60
Cl. nails, f.o.b. Eastern mills	1.80	1.80	1.80	...
Cl. nails, Pittsburgh	1.70	1.70	1.70	1.55
Fence wire, ann'd, 0 to 9, Pgh.	1.55	1.55	1.55	1.40
Base wire, galv., Pittsburgh	2.15	2.15	2.15	1.90

Coke, Connellsville, Per Net Ton, at Oven:			
Pernace coke, prompt shipment.	\$2.50	\$2.35	\$3.00
Pernace coke, future delivery.	2.50	2.50	3.00
Foundry coke, prompt shipment.	3.00	3.00	3.50
Foundry coke, future delivery.	3.00	3.00	3.50

Metals, Per Pound to Large Buyers:			
	Cents.	Cents.	Cents.
Lake copper, New York	15.00	15.00	16.50
Electrolytic copper, New York	14.87½	14.75	16.25
Spelter, St. Louis	6.20	6.10	6.60
Spelter, New York	6.35	6.25	6.75
Lead, St. Louis	4.20	4.20	4.20
Lead, New York	4.35	4.35	4.35
Tin, New York	48.50	48.50	48.75
Antimony, Hallett, New York	8.62½	8.62½	9.00
Tin plate, 100-lb. box, Pittsburgh	\$3.60	\$3.60	\$3.60

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.45c. to 1.75c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft., down to the weight of 3-16 in., take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.	.10
Gauges under 3-16 in. to and including No. 2	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine Steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inc.	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inc.	.50
Cutting to lengths or diameters under 1 ft.	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Structural Material.—I beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and tees, 3 in. and over, 1.45c. to 1.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, hand rail, car-truck and conductor rail)	.05
Angles, channels and tees, under 3 in. wide as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Hand rail tees	.75
Cutting to length, under 3 ft., to 2 ft. inclusive	.25
Cutting to length, under 2 ft., to 1 ft. inclusive	.50
Cutting to length, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Wire Rods and Wire.—Bessemer, open-hearth and chain rods, \$30. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, \$1.55; galvanized, \$1.95. Galvanized barb wire, to jobbers, \$2.15; painted, \$1.75. Wire nails, to jobbers, \$1.75.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.								
Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	\$1.70	\$1.75	\$1.80	\$1.85	\$1.95	\$2.05	\$2.15	\$2.25
Galvanized	2.10	2.15	2.20	2.25	2.35	2.45	2.85	2.95

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe (full weight) in effect from January 1, 1913, iron pipe (full weight), from October 21, 1912:

Steel.			Iron.		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
¼, ½ and ¾	73	82½	¼ and ½	67	48
¾	77	66½	¾	66	47
¾ to 3	80	71½	¾	70	57
			¾ to 2½	73	62
Lap Weld.					
2	77	68½	1½	57	46
2½ to 6	79	70½	1½	68	57
7 to 12	76	65½	2	69	59
13 to 15	53	..	2½ to 4	71	62
			4½ to 6	71	62
			7 to 12	69	56

Plugged and Reamed.					
1 to 3, butt	78	69½	1 to 1½, butt	71	60
2, lap	75	66½	2, butt	72	61
2½ to 4, lap	77	68½	1½, lap	55	44
			1½, lap	66	55
			2, lap	67	57
			2½ to 4, lap	69	60

Butt Weld, extra strong, plain ends.					
¼, ½ and ¾	68	57½	¾	64	53
¾	73	66½	¾	68	61
¾ to 1½	77	70½	¾ to 1½	72	63
2 to 3	78	71½	2 and 2½	73	64

Lap Weld, extra strong, plain ends.					
2	74	65½	1½	66	60
2½ to 4	76	67½	2	67	59
4½ to 6	75	66½	2½ to 4	71	62
7 to 8	68	57½	4½ to 6	70	61
9 to 12	63	52½	7 and 8	64	54
			9 to 12	59	48

Butt Weld, double extra strong, plain ends.					
¼	63	56½	¾	58	50
¾ to 1½	66	59½	¾ to 1½	61	53
2 to 2½	68	61½	2 to 2½	63	55

Lap Weld, double extra strong, plain ends.					
2	64	57½	2	56	50
2½ to 4	66	59½	2½ to 4	61	55
4½ to 6	65	58½	4½ to 6	60	54
7 to 8	58	47½	7 to 8	53	43

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers in carloads on lap welded steel, in effect from February 1, 1913, and standard charcoal iron boiler tubes, in effect from January 1, 1913, as follows:

Lap Welded Steel.	Standard Charcoal Iron.
1½ and 2 in.	60
2½ in.	57
2½ and 3 in.	63
3 and 3½ in.	68
3½ to 4½ in.	70
5 and 6 in.	63
7 to 13 in.	60
	1½ in.
	1½ and 2 in.
	2½ in.
	2½ and 3 in.
	3 and 3½ in.
	3½ to 4½ in.
	5 and 6 in.
	7 to 13 in.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2½ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.		Cents per lb.	
Nos. 3 to 8		1.70	
Nos. 9 and 10		1.75	
Nos. 11 and 12		1.80	
Nos. 13 and 14		1.85	
Nos. 15 and 16		1.95	
Box Annealed Sheets, Cold Rolled.			
Nos. 10 and 11		2.00	
No. 12		2.00	
Nos. 13 and 14		2.05	
Nos. 15 and 16		2.10	
Nos. 17 to 21		2.15	
Nos. 22 and 24		2.20	
Nos. 25 and 26		2.25	
No. 27		2.30	
No. 28		2.35	
No. 29		2.40	
No. 30		2.50	

Galvanized Sheets of Black Sheet Gauge.

	Cents per lb.
Nos. 10 and 11	2.50
No. 12	2.60
Nos. 13 and 14	2.60
Nos. 15 and 16	2.75
Nos. 17 to 21	2.90
Nos. 22 and 24	3.05
Nos. 25 and 26	3.20
No. 27	3.35
No. 28	3.50
No. 29	3.65
No. 30	3.80

Pittsburgh

PITTSBURGH, Pa., March 4, 1913.

The market has a more cheerful tone and more optimistic talk is heard as to the future. The large steel companies all report that specifications in February were in excess of shipments, and this is expected for March. The output of semi-finished and finished iron and steel is heavier than ever before and yet the leading mills are getting further back in deliveries. Those who are inclined to take a pessimistic view constantly refer to the fact that the new demand has fallen off, but this does not mean much as the steel mills are sold ahead for months and have actual orders on their books that will take their output to July or longer. In isolated cases there have been reports of shading in prices, but this has been small. Heavy inquiries are reported for nearly all kinds of material for delivery in last half. A further recovery in coke is noted and furnace coke is now firm at \$2.50, at oven, for prompt shipment.

Pig Iron.—W. P. Snyder & Co. report the average price of Bessemer iron in February to have been \$17.25 and of basic \$16.317, both Valley furnace. In the absence of sales of both Bessemer and basic iron, with the exception of 1500 tons of basic sold to the Colonial Steel Company in February prices have held up remarkably well. A buying movement is looked for before this month is out. Recently the American Steel Foundries sent out inquiries for 2000 tons or more of basic iron per month for delivery commencing March, and was quoted in one case \$16.60, delivered Sharon, Pa., equal to \$16.35 at makers' furnace, while Mahoning Valley interests quoted \$16.65, delivered, equal to \$16.25 at furnace. The business was not closed, the buyer stating it would not contract for the present. Two local open-hearth steel makers are also expected to buy basic iron this month for second-quarter, but have not as yet sent out their inquiries. The tone of the pig iron market is firmer, probably due to the expected buying. We quote Bessemer iron for delivery up to July at \$17.25; basic, \$16.25; malleable Bessemer, \$17 to \$17.25; gray forge, \$16.25 to \$16.50, and No. 2 foundry, \$17 to \$17.25, all at Valley furnace, the freight rate for delivery in the Pittsburgh district being 90c. a ton.

Billets and Sheet Bars.—The National Tube Company has bought 6000 tons of open-hearth billets from a steel car forge company at Butler, Pa., to be shipped to the tube mills at Ellwood City, Pa. There is not much new inquiry and the few odd lots of billets and sheet bars that are changing hands are sold mostly by dealers that have secured some steel in exchange for pig iron. A steel mill reports a sale of 100 tons of either Bessemer or open-hearth billets for prompt shipment at \$30 at mill. Prompt billets continue to bring \$30 and sheet bars have sold in small lots for prompt delivery at about \$31 at maker's mill, but not enough new sales are being made on which to base prices. The steel market nominally is as follows: Bessemer billets, \$28.50 to \$29; Bessemer sheet bars, \$29 to \$29.50; open-hearth billets, \$29 to \$29.50, and open-hearth sheet bars, \$29.50 to \$30, f.o.b. mill, Pittsburgh or Youngstown. Forging billets, \$36 to \$37, and axle billets, \$34 to \$35, Pittsburgh.

Ferroalloys.—Inquiry for ferromanganese is quiet, most consumers being covered for some months ahead and getting reasonably prompt deliveries. An occasional carload or two is being sold for prompt delivery at about \$64, seaboard. We quote 80 per cent. foreign ferromanganese at \$64 to \$65, Baltimore, the rate to Pittsburgh being \$1.95 a ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at \$75; over 100 tons to 600 tons, \$74; over 600 tons, \$73, Pittsburgh. We quote 10 per cent. at \$24; 11 per cent., \$25; 12 per cent., \$26, f.o.b. cars at furnace, Jackson, Ohio, or Ashland, Ky. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over and 12½c. in lots up to 2000 lb.

Wire Rods.—Consumers being well covered ahead, there is little new inquiry. Bessemer, open hearth and chain rods are firm at \$30, Pittsburgh.

Muck Bar.—In the absence of sales, we quote best

grades of muck bar made from all pig iron at nominally \$31, Pittsburgh. If any new business was offering this price might be shaded.

Skelp.—No recent sales are reported, but skelp is firm and the mills are sold ahead for some time. We quote grooved skelp at 1.45c. to 1.50c.; sheared steel skelp, 1.50c. to 1.55c.; grooved iron skelp, 1.75c. to 1.80c.; sheared iron skelp, 1.85c. to 1.90c., delivered at buyers' mills in the Pittsburgh district.

Steel Rails.—The Carnegie Steel Company reports no new sales of standard sections, but the demand for light rails is active, and specifications against contracts are coming in freely. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Car Wheels.—Some heavy inquiries are in the market for cast iron and steel wheels. We quote 33-in. rolled steel wheels for freight service at \$15 to \$15.50 and 36-in. for passenger cars at \$19 to \$19.50 per wheel, f.o.b. Pittsburgh.

Structural Material.—The report that the Jones & Laughlin Steel Company had taken 2100 tons for a new office building for the City Furniture Company at Altoona, Pa., is incorrect, the order amounting to less than 200 tons. Bids are to be made in a few days on 6000 to 7000 tons for the Kaufmann-Baer department store in this city, and also on about 1000 tons for the Pennsylvania Rubber Company, Jeannette, Pa. New inquiry has been quiet, but a good deal of work is in sight. We quote beams and channels up to 15 in. at 1.45c. to 1.50c. for delivery at convenience of the mill, which would be second half of this year, while small lots from warehouse for prompt delivery are bringing from 1.60c. up to 2c., depending on the size of the order and the deliveries wanted.

(By Telegraph, March 5.) The McClintic-Marshall Construction Company has taken 650 tons for an ore bridge for the Bethlehem Steel Company, South Bethlehem, Pa., and 400 tons for the new Koppers by-product coke oven plant being built by the Republic Iron & Steel Company, Youngstown. The American Bridge Company has taken 1200 tons for new steel buildings for the Aluminum Company of America, Massena Springs, N. Y., and 600 tons of bridge work for the Wheeling & Lake Erie Railroad.

Plates.—The Carnegie Steel Company has taken 14,000 to 15,000 tons of hull material and protective deck plate for the battleship Pennsylvania, the report that this business had gone to another interest being incorrect. Orders for steel cars in the past week have been light, but a good many inquiries are out. The Cincinnati, New Orleans & Texas Pacific has placed 100 steel underframe box cars and 100 steel underframe automobile box cars with the American Car & Foundry Company and 50 steel hoppers and 100 steel gondolas with the Cambria Steel Company. The car companies are complaining of unsatisfactory deliveries by the plate mills, which they claim are restricting output to a considerable extent. We quote ¼-in. and heavier tank plate at 1.45c., Pittsburgh, for forward delivery, while for shipment in three to four weeks 1.60c. to 1.65c. is quoted for carload and larger lots, and from 1.75c. to as high as 2c. for small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—There is no decrease in specifications against contracts for steel bars, but on the contrary the three leading makers report specifications in February somewhat heavier than in January. The Republic Iron & Steel Company reports that practically its entire output of steel bars for this year is under contract and none of the other mills has any tonnage to sell for delivery before July and only a limited amount for third quarter. The new demand for iron bars is heavy and mills are sold up for several months ahead. We quote merchant steel bars at 1.40c. to 1.45c. for delivery at convenience of the mill, which would not be before third quarter, while for shipment from warehouses 1.90c. to 2c. is quoted. We quote iron bars at 1.70c. to 1.75c. for reasonably prompt delivery. Mills charge \$1 extra per ton for twisting ¼-in. and larger steel bars and \$2 extra for ½ to ¾ in.

Sheets.—Very little abatement is observed in the heavy demand for sheets, which has been a feature of the market for some months, and specifications against contracts continue to come in at an unprecedented rate. The mills are all operating to practically as full capacity as the supply of steel will admit. A few makers state that deliveries of steel are slightly better, but

others claim it is as scarce as ever. Most of the sheet mills have their product sold up to July, and some have entered contracts from manufacturing customers for third quarter delivery. We quote 1.75c. for No. 10 blue annealed; 2.35c. for No. 28 Bessemer black sheets; 3.50c. for No. 28 galvanized, and 2.30c. for No. 28 tin mill black plate. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Tin Plate.—Specifications against contracts in February were a disappointment to the makers, but an improvement in this respect is looked for this month. All the mills are running to as full capacity as possible, accumulating stocks to be shipped out against specifications commencing April. The market is strong, but there is no indication of any advance in prices in the near future. The proposed consolidation of a number of tin plate mills is still under negotiation, but the opinion is growing that nothing will come of it. We quote 100 lb. cokes at \$3.60; 100 lb. ternes at \$3.45 and No. 28 gauge black plate at \$2.30 f.o.b. Pittsburgh.

Spelter.—The market is slightly firmer. We quote prime grades at 6.10c., East St. Louis, equal to 6.22½c., Pittsburgh.

Railroad Spikes.—The new demand keeps up fairly well. Local spike makers state they are well filled up to July, and small railroad spikes can hardly be obtained for prompt shipment at any price. We quote railroad spikes in base sizes, 5½ x 9/16 in., on large contracts with the railroads, at \$1.80, while for carload lots \$1.90 is charged; small railroad and boat spikes, \$1.90 to \$2 per 100 lb., f.o.b. Pittsburgh for forward delivery.

Hoops and Bands.—The new demand is not large, but premiums continue to be paid on both hoops and bands for reasonably prompt shipment. Most consumers covered some time ago for their entire needs up to July, and makers report specifications against contracts coming in freely.

Shafting.—Many consumers are inquiring for shafting for delivery in first half of next year, and a good deal of such business is expected to be closed in the near future. Makers have a good part of their output sold up to July, and report specifications active. Prices are said to be firmly held. We quote cold rolled shafting at 58 per cent. off in carload and larger lots and 52 per cent. in small lots delivered in base territory.

Bolts and Rivets.—Direct reports made by makers of bolts and rivets show that they are from 45 to 70 days back in shipments, the general average being 62 days. The demand is fair, and premiums on rivets for prompt shipment are being obtained, one maker having sold two carloads recently at \$2.15, a premium of \$5 a ton. Rivets for spot shipment have brought as high as 3c. per lb. Any cutting in prices is claimed to be confined to very isolated cases, and owing to the difficulty in getting steel, which is interfering with output, makers claim there is no good reason for any shading. We quote button head structural rivets at \$2.20 and cone head boiler rivets at \$2.30 per 100 lb. The discounts on bolts are as follows, in lots of 300 lb. or over, delivered within a 20c. freight radius of maker's works:

Cone and lag screws.....	80 and 10% off
Small carriage bolts, cut threads.....	75 and 5% off
Small carriage bolts, rolled threads.....	75 and 10% off
Large carriage bolts.....	70% off
Small machine bolts, cut threads.....	75 and 10% off
Small machine bolts, rolled threads.....	75, 10 and 5% off
Large machine bolts.....	70 and 7% off
Machine bolts with C.P.C. and T nuts, small.....	75 and 5% off
Machine bolts with C.P.C. and T nuts, large.....	70% off
Square hot pressed nuts, blanked and tapped.....	\$5.70 off list
Hexagon nuts.....	\$6.30 off list
C.P.C. and R. square nuts, tapped and blank.....	\$5.70 off list
Hexagon nuts ¾ and larger.....	\$6.60 off list
Hexagon nuts smaller than ¾.....	\$7.20 off list
C.P. plain square nuts.....	\$5.20 off list
C.P. plain hexagon nuts.....	\$5.50 off list
Semi-finished hexagon nuts ¾ and larger.....	85% off
Semi-finished hex. nuts smaller than ¾.....	85 and 10% off
Rivets, 7/16 x 6½, smaller and shorter.....	75, 10 and 10% off
Rivets, metallic tinned, bulk.....	3½c. per lb. net extra
Rivets, tin plated, bulk.....	1½c. per lb. net extra
Rivets, metallic tinned, packages.....	70, 10 and 10% off

Merchant Steel.—Mills report that specifications in February fell off slightly as compared with January, but the heavier business is expected this month. Consumers are pretty well covered up to July, and as soon as the condition of the country roads is such that material can be moved in these districts an improved demand for certain grades of steel is expected. Most of the mills are still back considerably in shipments, but are making slightly better deliveries. We quote: Iron, finished tire, 1½ x ¾ in. and larger, 1.40c. to 1.55c.; base; under 1½ x ¾ in., 1.55c. to 1.65c.; planished tire, 1.60c. to 1.70c.; channel tire, ¾ to ¾ and 1 in., 1.90c. to 2c.; 1½ in. and larger, 1.80c. to 1.90c.; toe calk,

2c. to 2.10c.; base; flat sleigh shoe, 1.50c. to 1.65c.; concave and convex, 1.80c. to 1.90c.; cutter shoe, tapered or bent, 2.30c. to 2.40c.; spring steel, 2c. to 2.10c.; machinery steel, smooth finish, 1.80c. to 1.85c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.30c.; soft, 3.55c.; coils, hard, 3.20c.; soft, 3.45c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

Wire Products.—Last December the jobbing trade speighed quite freely against contracts for wire and wire nails, and accumulated heavy stocks, with the result that specifications in January and February showed a marked falling off. However, as spring trade will probably open up shortly, an improvement in the demand and also in specifications is looked for this month. Prices are reported firm, and it is stated that by April 1 the mills expect to have all the contracts for nails and wire taken last year at lower prices than are ruling now pretty well cleaned up. Any unspecified tonnage on April 1 will likely be canceled. We quote wire nails at \$1.75 per keg; cut nails, \$1.70 per keg; galvanized barb wire, \$2.15 per 100 lb.; painted, \$1.75; annealed fence wire, \$1.55, and galvanized fence wire, \$1.95, f.o.b. Pittsburgh, usual terms, freight added to point of shipment. Jobbers charge the usual advances for small lots from store.

Merchant Pipe.—New orders entered by the mills in February showed a falling off as compared with January, but were higher than in February of last year. No large gas or oil lines are in the market, but there is a good, steady demand for small lots of line pipe, ranging from two to three miles up. The mills report a continued heavy demand for gas and oil well supplies, which is referred to as being much heavier than usual at this season. There is still some shading in discounts on merchant pipe, but not exceeding 2½ to 5 per cent. All the pipe mills are running to as full capacity as the supply of steel will admit and have a good deal of business ahead.

Boiler Tubes.—The new demand for locomotive tubes is heavy. Makers of seamless tubes also report a continued strong demand, and state that they are back in shipments from 12 to 14 weeks. As yet there has been no change in discounts on iron boiler tubes, but an advance of one or two points is looked for soon.

Iron and Steel Scrap.—The slight improvement noted early last week seems to have faded, largely owing to the fact that the leading local consumer has again withdrawn from the market. Turnings are demoralized and have sold as low as \$8.50 delivered. Bundled sheet scrap has shown a sharp decline and has sold at about \$10 per gross ton at maker's mill. At present borings are still about \$1.50 a ton higher than turnings, which is very unusual. The scrap list of the Pennsylvania Railroad closes March 7 and the Baltimore & Ohio March 10, and both are heavy. The prices paid by dealers for this scrap will give a better idea of the actual market. We note sales of about 3000 tons of selected No. 1 heavy melting scrap at \$14.25 to \$14.50; 700 tons of low phosphorus melting scrap at \$17.25; 500 tons of bundled sheet scrap at about \$10 at maker's works. We have revised prices on bundled sheet scrap, low phosphorus melting stock and turnings, and quote per gross ton as follows:

Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery.....	\$14.00 to \$14.25
No. 1 foundry cast.....	15.00 to 15.25
No. 2 foundry cast.....	14.00 to 14.25
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district.....	11.00 to 11.25
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.....	16.25 to 16.50
No. 1 railroad malleable stock.....	14.25 to 14.50
Grate bars.....	10.75 to 11.00
Low phosphorus melting stock.....	17.25 to 17.50
Iron car axles.....	24.25 to 24.75
Steel car axles.....	17.75 to 18.00
Locomotive axles, steel.....	21.75 to 22.00
Locomotive axles, iron.....	27.75 to 28.00
No. 1 busheling scrap.....	14.25 to 14.50
No. 2 busheling scrap.....	10.25 to 10.50
Old carwheels.....	15.75 to 16.00
*Cast-iron borings.....	10.00 to 10.25
*Machine shop turnings.....	8.50 to 8.75
†Steel bar crop ends.....	16.00 to 16.25
Old iron rails.....	16.25 to 16.50
No. 1 railroad wrought scrap.....	16.00 to 16.25
Heavy steel axle turnings.....	12.50 to 12.75
Stove plate.....	10.25 to 10.50

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.

†Shipping point.

Coke.—While only a limited demand is current for furnace coke for prompt shipment, the market is firm and best grades are held at \$2.50 to \$2.60 at oven. The swift decline in prices has driven low grade coke

out of the market, and most of the business now being placed is for Connellsville coke, which always commands the best prices going. Sales of 6000 to 8000 tons of standard grade furnace coke for prompt shipment are reported in the past week at \$2.40 to \$2.50 at oven, but it is claimed that \$2.50 is now minimum. The new demand for foundry coke is quiet, but prices are firm. We quote standard makes of furnace coke for prompt shipment at \$2.50 to \$2.60 per net ton at oven, and on contracts up to July at \$2.50 at oven. We quote standard makes of 72-hour foundry coke for prompt delivery at \$3 to \$3.25, but inferior grades are offered at lower prices. The Connellsville Courier reports the output of the Upper and Lower Connellsville regions last week as 441,645 net tons, an increase over the previous week of 8204 tons and the heaviest output ever made in any one week.

Chicago

CHICAGO, ILL., March 5, 1913.—(By Telegraph)

It is generally accepted that this market is on the eve of a heavy spring contracting season in which will be involved steel, iron and reinforcing bars for concrete construction and structural shapes for implement and building purposes in particular. For the reports of an easing off in the tonnage of new business offering there is undoubtedly some temporary foundation, but this is without significance in the light of the undiminished specifications and the new buying that is imminent. February reports show that allowances for the short month will bring the total specifications received by local mills practically on a par with those of January and considerably in excess of shipments, notwithstanding the latter are going from mill at a record-breaking rate. For the present, rail requirements appear well covered, but inquiry for track fastenings is active and sales of 15,000 tons of tie plates are noted. The placing of a number of contracts for plates and sheets for second half delivery is reported, and while price and delivery conditions are not materially different from those incident to first half business, they reflect in a measure the easier mill conditions for third and fourth quarter. Pig iron trading continues fitful and lacking in definiteness, but without perceptible change as to prices. Buying of scrap is a little more general, perhaps, but in insufficient quantity to bring strength to the market.

Pig Iron.—Buying is still of a scattering character. Inquiry, however, is more general, especially for Northern iron, and covers delivery in the third quarter and second half. The rapid rate at which foundries are melting iron and the obligations already on their books, extending in many cases well through the remainder of the year, for which purchases of pig iron to cover have not yet been made, disclose considerable latent strength in the furnace position, notwithstanding the market weaknesses of the past two months. That this strength will make itself felt in a price reaction as soon as the melters begin to provide for their requirements can hardly be doubted. The increasing inquiry may well be considered as a recognition of the fact that the foundry melt is now taking the iron from the furnace as rapidly as it can be shipped. Southern iron quotations continue to range upward from a possible \$13 for Tennessee iron. For Alabama No. 2, \$13.50 at Birmingham prevails. Local iron can be had generally at \$17.50, with both lower and higher prices reported according to the iron specifications. The following quotations are for iron delivered at consumers' yards except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4....	\$18.00 to \$18.75
Northern coke foundry, No. 1.....	17.75 to 18.25
Northern coke foundry, No. 2.....	17.25 to 18.00
Northern coke foundry, No. 3.....	16.75 to 17.25
Southern coke, No. 1 foundry and No. 1 soft	18.35 to 18.85
Southern coke, No. 2 foundry and No. 2 soft	17.85 to 18.35
Southern coke, No. 3.....	17.35 to 17.85
Southern coke, No. 4.....	16.85 to 17.35
Southern gray forge.....	16.85 to 17.35
Southern mottled.....	16.35
Malleable Bessemer.....	17.25 to 17.75
Standard Bessemer.....	19.40 to 19.90
Basic.....	17.25 to 17.75
Jackson Co. and Kentucky silvery, 6 per cent.....	20.40
Jackson Co. and Kentucky silvery, 8 per cent.....	21.40
Jackson Co. and Kentucky silvery, 10 per cent.....	22.40

(By Mail)

Rails and Track Supplies.—Inquiry for spikes and track bolts is active, but in most instances the railroads

are finding it necessary to be satisfied with much later deliveries than desired. The recent inquiries for tie plates have resulted in the buying of 10,000 tons by the Atchison, Topeka & Santa Fe and 5000 tons by the Great Northern. One of these orders was placed with a Western mill and one will be filled from the East. No important rail inquiries are reported. We quote standard railroad spikes at 1.95c. to 2.05c., base; track bolts with square nuts, 2.30c. to 2.40c., base, all in carload lots, Chicago; tie plates, \$32 to \$35 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—Miscellaneous inquiries for small quantities are not infrequent in this market, but where orders result they are generally placed with Eastern mills. Some of the business offering appears to be a duplicate ordering induced by more recent prospects of better delivery. The general situation has not changed sufficiently as regards deliveries to make any great amount of such redistribution possible. An encouraging feature is the fact that projects are not abandoned because of the long delay necessary in obtaining steel but the necessary orders are sent in for such shipment as is possible. This indicates a confidence in the continuance of conditions warranting extensions of business. Contracts for fabricated steel placed during the week totaled about 3000 tons, of which the largest was for 1263 tons of girders awarded to the American Bridge Company by the Chicago, Burlington & Quincy Railroad. This company will also furnish 396 tons for the Wabash Railroad and 129 tons for the Puget Sound Bridge & Dredging Company. The McClintic-Marshall Construction Company will fabricate 418 tons for the Koppers Company for coke ovens at Youngstown, Ohio; Kansas City Structural Company, 160 tons for the Oppenstein Theater, Kansas City; Lackawanna Bridge Company, 159 tons for the American Radiator Company for the remodeling of its plant at Bremen, Ind.; Kenwood Bridge Company, 205 tons for a Chicago, Rock Island & Pacific grain elevator at Kansas City. The contract for a bridge on Wilson avenue, Chicago, calling for 232 tons, has also been let. For mill shipment, Chicago delivery, we quote 1.63c. to 1.68c.

The larger warehouse stocks of structural shapes are now normally heavy, but some of the smaller jobbers have not been able apparently to balance their various lines, so continuous has been the heavy demand upon their supply. As a result, some sizes are obtainable only by shopping around. We quote from store 2.05c.

Plates.—New orders for cars and locomotives from Western roads include no purchases of unusual importance, but a number of the railroads are still buying miscellaneous equipment. The Chicago, Burlington & Quincy ordered 25 engines for switching purposes from the Baldwin Locomotive Works. Some of the mills are booking plate tonnage for second-half delivery and they report a disposition on the part of users to buy freely. Plates for delivery in from three to five weeks are selling on the basis of 1.60c., Pittsburgh. For regular delivery we quote for mill shipment at Chicago, 1.63c.

The higher prices are now in effect on practically all material being used, and those who bought under the more favorable conditions of a year ago have less of an advantage, with the result that more jobs are being figured on store prices. Last week brought out a record breaking number of orders. We quote for delivery from store 2.05c.

Sheets.—While some minor concessions are noted in the placing of sheets, advances of about \$1 a ton are reported on galvanized sheets, sold for delivery in the second quarter. Inquiry for second half is moderately active, and some sales are noted, but for the most part new business in sheets is temporarily quieter. We quote for Chicago delivery in carloads from mill: No. 28 black sheets, 2.53c.; No. 28 galvanized, 3.68c.; No. 10 blue annealed, 1.93c.

Out of store prices continue without change as follows: No. 10 blue annealed, 2.25c.; No. 28 black, 2.90c.; No. 28 galvanized, 4.15c.

Bars.—Bar iron specifications have shown renewed activity and noticeably increased tonnages have been booked. One maker reports that while new orders have not been so heavy in tonnage as they were prior to January they have still continued to exceed shipments, so that orders on the books March 1 reached a new high point. Reports of steel bar specifications in February show that they fell short of January by such a slight margin as might be accounted for by the shorter month. The approach of the season for reinforcing bars is manifested in an active inquiry and a number of sales. With the requirements of the concrete build-

ing trade and the implement makers to be met, the next few months promise unusual activity in bars. We quote for mill shipment as follows: Bar iron, 1.57½c. to 1.62½c.; soft steel bars, 1.58c. to 1.65c.; hard steel bars, 1.60c. to 1.70c.; shafting in carloads, 58 per cent. off; less than carloads, 53 per cent. off.

For delivery from store, we quote soft steel bars, 1.95c.; bar iron, 1.95c.; reinforcing bars, 1.95c. base with 5c. extra for twisting in sizes ¾ in. and over, and 7½c. extra for smaller sizes; shafting 21 per cent. off.

Rivets and Bolts.—Some contracts for structural rivets are being made by local fabricators but general activity is lacking. The consumption of machine screws and bolts is apparently undiminished, and deliveries from mill do little more than keep pace with specifications. Prices are firm and unchanged. We quote from mill as follows: Carriage bolts up to ¾ x 6 in., rolled thread, 75-10; cut thread, 75-5; larger sizes, 70-2½; machine bolts up to ¾ x 4 in., rolled thread, 70-10-5; cut thread, 75-10; large size, 70-7½; coach screws, 80-10; hot pressed nuts, square head, \$5.70 off per cwt.; hexagon, \$6.30 off per cwt. Structural rivets, ¾ to 1¼ in., 2.38c., base, Chicago, in carload lots; boiler rivets, 0.10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to ¾ x 4 in., 70-7½; larger sizes, 65-5; carriage bolts up to ¾ x 6 in., 70-5; larger sizes, 65 off. Hot pressed nuts, square head, \$5.30, and hexagon, \$5.90 off per cwt.

Wire Products.—The past week brought out the expected increase in inquiry and shipments for wire nails, barb wire and fencing. The spring demand for wire nails appears to be well started, and the fact that the dealers have been carrying only small stocks because of their ability to obtain materials promptly from jobbers indicates the awakening of consumers' demands. We quote as follows: Plain wire, No. 9 and coarser, base, \$1.73; wire nails, \$1.93; painted barb wire, \$1.93; galvanized, \$2.33; polished staples, \$1.93; galvanized, \$2.33, all Chicago.

Cast-Iron Pipe.—A Chicago contract for 5000 tons of pipe was awarded to the United States Cast Iron Pipe & Foundry Company, and at Grand Rapids, Mich., an order was placed for 1000 tons. For the city of Minneapolis an additional 1200 tons is being purchased. Pipe prices have been weak and we lower quotations \$1 a ton, quoting as follows per net ton, Chicago: Water pipe, 4 in., \$30; 6 to 12 in., \$28; 16 in. and up, \$27, with \$1 extra for gas pipe.

Old Material.—Melters of scrap in this market are finding themselves able to absorb somewhat increased quantities of material, especially rolling mill grades, heavy melting steel and cast scrap, but this demand is still far from proportionate to the supply available. The market weakness due to this oversupply is being accentuated by the offerings from the Santa Fé accumulations, although it is claimed that no considerable amount has been disposed of as yet. The Chicago & Northwestern has 3500 tons of scrap for sale, including 700 tons of rails; the Chicago Junction, 1000 tons, most of which is scrap rail, and the St. Louis & San Francisco 800 tons. The Chicago, Rock Island & Pacific sold about 2400 tons during the week. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.	
Old iron rails	\$16.25 to \$16.75
Old steel rails, rerolling	15.00 to 15.50
Old steel rails, less than 3 ft.	14.00 to 14.50
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	16.75 to 17.25
Heavy melting steel scrap	12.00 to 12.50
Frogs, switches and guards, cut apart.	12.00 to 12.50
Shoveling steel	11.75 to 12.25
Steel axle turnings	10.50 to 11.00

Per Net Ton.	
Iron angles and splice bars	\$15.50 to \$16.00
Iron arch bars and transoms	16.00 to 16.50
Steel angle bars	11.50 to 12.00
Iron car axles	21.00 to 21.50
Steel car axles	18.50 to 19.00
No. 1 railroad wrought	12.00 to 12.50
No. 2 railroad wrought	11.25 to 11.75
Cut forge	11.25 to 11.75
Steel knuckles and couplers	12.25 to 12.75
Steel springs	12.50 to 13.00
Locomotive tires, smooth	13.25 to 13.50
Machine shop turnings	7.50 to 8.00
Cast and mixed borings	6.50 to 7.00
No. 1 busheling	10.25 to 10.75
No. 2 busheling	7.50 to 8.00
No. 1 boilers, cut to sheets and rings.	8.75 to 9.25
Boiler punchings	12.50 to 13.00
No. 1 cast scrap	12.50 to 13.00
Stove plate and light cast scrap.	10.25 to 10.75
Railroad malleable	13.00 to 13.50
Agricultural malleable	11.50 to 12.00
Pipes and flues	8.75 to 9.25

Philadelphia

PHILADELPHIA, PA., March 4, 1913.

After a long period of comparative dullness more active conditions have developed in the pig-iron market. As is usually the case heavier buying has been accompanied by lower prices. Semi-finished steel has been more active, with good inquiries and further sales of rolling and forging billets for Western shipment. Plate and shape makers are taking on considerably more business, and in some classes of material recent easiness in delivery has again hardened. Considerable railroad business in materials for car and locomotive construction is before the trade. Furnace coke is firmer, with smaller offerings for prompt shipment. The old material market, while not active, shows indications of stiffening prices.

Iron Ore.—Inquiry is very quiet. Importations during the week include 5364 tons from Sweden, 3700 tons from Greece and 4800 tons from Cuba.

Pig Iron.—Cast-iron pipe makers, who have been quietly feeling the market recently, have been the most important buyers. The leading maker on the Delaware River is reported to have made round purchases of Southern iron, while another has made a number of purchases ranging from 1000 to 2000 tons, taking both Northern and Virginia irons, at \$16.25 to \$16.50, delivered, on the Northern iron. A pipe maker at Lynchburg, Va., bought 7000 tons of Virginia iron for second quarter at \$14.50 to \$14.95 for No. 3 foundry. Further inquiry for round lots of low grade iron is being figured on both in this and the Virginia markets. In the higher grades of foundry iron further weakness has developed. With inquiry increasing some producers appear more anxious to put on tonnage, and the concessions offered by some are met by others. Central Pennsylvania No. 2 X foundry has been offered in this market at \$17.80, delivered, and while Eastern furnaces are still inclined to hold pretty firmly to an \$18 minimum for standard brands they will for the most part protect regular customers rather than lose the business at a small concession. No large inquiries have come out in the higher foundry grades, the bulk of the sales continuing on a small basis, few exceeding 100 to 200 tons. Buyers are still inclined to await developments and, being pretty well supplied for near future requirements, show no haste in coming into the market. At the same time deliveries on contracts are being taken freely and in many cases producers are being urged for shipments. Outside of the movement in low grade Virginia foundry iron has been rather quiet. Small sales of No. 2 X and No. 2 plain continue to be made for second-quarter shipment at \$15.50 and \$15.25 at furnace, respectively. Sales of small lots of coke, malleable and charcoal iron have been made at unchanged prices. Some little business in rolling mill forge has been done at close to \$17, delivered, but the market is weak. Basic continues uncalled for in this district, large buyers being fully covered for several months ahead. The Cumberland consumer recently in the market has closed for 3000 tons of Western basic for second-half delivery. In the absence of business in the East quotations are nominal at \$18, although this price could probably be shaded 50c. a ton on a good inquiry. A consumer in this territory has bought 600 to 700 tons of Eastern Bessemer at \$19, delivered. Small sales of both standard and misfit low phosphorus have been made on a basis of \$24.50, delivered, for standard analysis iron. The general range of prices continues irregular, the following quotations about representing the market for delivery in buyers' yards in this vicinity:

Eastern Pennsylvania No. 2 X foundry.	\$17.80 to \$18.25
Eastern Pennsylvania No. 2 plain.	17.55 to 17.75
Virginia No. 2 X	18.30 to 18.50
Virginia No. 2 plain	18.05 to 18.25
Gray forge	17.00
Basic, nominal	18.00
Standard low phosphorus	24.50

Ferroadloys.—The market is quiet. Eighty per cent. ferromanganese for forward delivery is quoted at \$65, seaboard. Small sales of prompt ferromanganese have been made at \$64.50, the prompt market being a shade stronger owing to fewer offerings. Importations of ferromanganese at this port last week aggregated 1365 tons. Inquiry for ferrosilicon is confined to small lots.

Billets.—A broader demand, both for rolling and forging billets, is in evidence. Orders have been larger, both for early and forward delivery. One sale of 2000 tons of rolling billets for shipment to the Pittsburgh district over the next three months is noted. Heavier orders for forging billets for distant delivery have also been entered by Eastern mills. Numerous

inquiries for delivery over the third quarter as well as last half have been coming out, but Eastern makers are not willing to sell far ahead, except to regular customers. The market has a strong appearance, mills being fully engaged, and specifications are coming out freely. Quotations are firm at \$32 delivered, for basic open-hearth rolling and \$36 mill, for ordinary forging billets.

Plates.—New tonnage has been coming out more freely. Specifications have also been heavier, and mills in this district are not making quite as free deliveries. Several comparatively good contracts for second-quarter delivery have been entered and good orders as well as specifications have been received in car, bridge and locomotive plates. Prospects for the future are considered bright. Quotations are very firm at 1.75c. minimum for sheared and 1.80c. for universal plates, for reasonably early shipment, delivered in buyers' yards in this district.

Structural Material.—Makers of plain shapes have experienced a heavier run of business. Miscellaneous orders have been more numerous and mills are well booked ahead. No definite plans for large work have come out, although specifications for the proposed new South Penn square office building are about ready and include from 2000 to 3000 tons of structural material. Inquiry is also expected in the near future for some 5000 tons of material for a coal pier in Charleston, S. C. Eastern mills are not able to make deliveries on general orders inside of 10 to 12 weeks, although they can still fill in on rollings for small lots of plain material. Prices are firm at 1.75c. delivered for forward and 1.85c. to 2c. for prompt shipments.

Sheets.—Increased activity in demand is reported, particularly for early deliveries. Shipments in some instances are easier. Mills are fully engaged and have entered considerable third quarter business. Western sheets are comparatively firm at 1.90c. delivered here for No. 10 blue annealed, while Eastern mills making smooth loose-rolled sheets quote 2c. for reasonably early shipment.

Bars.—The market for iron bars has been less active, while offerings are larger, due to the fact that mills are rapidly catching up on orders. Ordinary iron bars are now freely available at 1.67½c. delivered here, for prompt or forward shipment. Recent premiums for prompt shipment have practically disappeared. Steel bars are in comparatively active demand at 1.55c. to 1.60c. for ordinary deliveries.

Old Material.—While buying has not been large a feeling prevails that conditions are in the direction of improvement. In some lines prices show a firmer tendency. One Eastern steel mill has purchased several thousand tons of No. 1 heavy melting steel at \$13 delivered, although several other mills, not actively in the market, still refuse to pay over \$12.50. No. 1 railroad wrought also appears stronger, with some mills apparently ready to buy, but little comes out at the recent low prices. In many lines the market still exhibits a waiting tendency. Quotations are largely nominal; in few grades has enough been done to establish a market. The following range about represents the market for small lots, delivered in buyers' yards in this district, covering eastern Pennsylvania and nearby points, taking a freight rate varying from 35c. to \$1.35 per gross ton:

No. 1 heavy melting steel	\$13.00
Old steel rails, rerolling (nominal)	\$15.50 to 16.00
Low phosphorus heavy melting steel scrap	17.75 to 18.25
Old steel axles (nominal)	19.00 to 20.00
Old iron axles (nominal)	27.00 to 28.00
Old iron rails	18.00 to 18.50
Old carwheels	15.00 to 15.50
No. 1 railroad wrought (nominal)	15.00 to 15.50
Wrought-iron pipe	12.50 to 13.00
No. 1 forge fire	12.00 to 12.50
No. 2 light iron (nominal)	7.00 to 7.50
No. 2 cut busheling	10.00 to 10.25
Wrought turnings	10.00 to 10.50
Cast borings	10.00 to 10.50
Machinery cast	14.00 to 14.50
Grate bars, railroad	10.50 to 11.00
Stove plate	10.50 to 11.00
Railroad malleable (nominal)	13.00 to 13.50

Coke.—Reduced supplies of prompt furnace coke have stiffened the market. Consumers in this district who paid \$2.25 at oven for prompt coke last week, have paid \$2.40 for moderate lots and some makers are asking \$2.50 to \$2.60. There has been no movement in forward furnace coke. Foundry coke remains irregular. Moderate lots have been sold at prices ranging from \$3 to \$4 at oven, according to grade. For delivery in buyers' yards in this district, the following prices, per net ton, are named:

Connellsville furnace coke	\$4.70 to \$5.20
Connellsville foundry coke	5.25 to 6.25
Mountain furnace coke	4.35 to 4.85
Mountain foundry coke	5.00 to 5.75

Henry Potts & Co. is a new firm succeeding Potts & Wittman, dissolved March 1 by mutual consent. The business formerly conducted by Potts & Wittman will hereafter be carried on at 650 Real Estate Trust Building, Philadelphia, Pa., by Henry Potts & Co.

N. B. Wittman, formerly of Potts & Wittman, will continue to act as Eastern coke sales agent for the Keystone Coal & Coke Company and the Latrobe-Connellsville Coal & Coke Company, and will also carry on business in ore, metals and coke under the name of N. B. Wittman & Co., at 522 Arcade Building, Philadelphia, Pa., acting as selling agents for ores for Sota & Aznar, Bilbao and London.

Cleveland

CLEVELAND, OHIO, March 4, 1913.

Iron Ore.—Shipments from docks to furnaces, which have been good most of the winter, are now heavy. With the approach of milder weather, shipping orders have increased. It is expected that the tonnage on docks May 1 will be less than it has been for several seasons past. Vessel men are looking for an early opening in navigation, as the winter has not been severe. With the heavy tonnage to be moved this season, vessel owners are anxious to get their boats under way as early as possible. The market is quiet, the only transaction reported being a resale of a small tonnage of Bessemer ore. While most furnaces are covered for their requirements, some buying is expected about the time of the opening of navigation. We quote prices as follows: Old Range Bessemer, \$4.40; Mesaba Bessemer, \$4.15; Old Range non-Bessemer, \$3.60; Mesaba non-Bessemer, \$3.40.

Pig Iron.—The market shows only a limited amount of activity. While some inquiry has come out for last half foundry iron, little business has been placed. Some sellers look for a general buying movement for the last half during the present month. While local furnaces are quoting \$17 at furnace as the minimum price for No. 2 foundry for Cleveland and nearby delivery, this price is being shaded for shipment to distant points, the price depending on the time of delivery and the ruling market price at the consuming point. In Cleveland no sales whatever are reported. One Valley interest is offering No. 2 foundry at \$16.75 for prompt shipment. For future delivery the \$17 quotation is quite general. While some sellers expect the last half market to be established on the \$17 basis, others look for a stiffening of prices to \$17.50, when the buying movement sets in. Southern iron is weak, being freely offered at \$13.25, Birmingham, for spot shipment and first half, and \$13.50 for the last half. There is apparently no falling off in the heavy consumption. For prompt shipment and for the first half we quote, delivered Cleveland, as follows:

Bessemer	\$18.15
Basic	\$17.00 to 17.25
Northern No. 2 foundry	17.25 to 17.50
Southern No. 2 foundry	17.35 to 17.85
Gray forge	17.00 to 17.25
Jackson County silvery, 8 per cent. silicon	20.55 to 21.55

Coke.—The market continues quiet, the only activity being small lot sales of foundry grades. Prices on foundry coke are weak but quotations are unchanged. Connellsville furnace coke is quoted at \$2.50 per net ton at oven for prompt shipment and \$2.50 to \$2.75 for contract. Standard brands of 72-hr. foundry coke are held at \$3.50 for prompt shipment and contract.

Finished Iron and Steel.—While some pessimistic talk is heard, there is apparently nothing in the local situation to warrant it. Specifications continue heavy, consumers are still crowding the mill for deliveries, warehouse business shows no falling off, prices are very firm and the usual premiums that have prevailed recently are being paid for steel for early delivery. The demand for rails from traction lines has become quite active. The Cleveland Railway Company has just placed an order for 3700 tons of girder rails for extensions and replacements and has given the Carnegie Steel Company an order for 20,000 steel ties. The Toledo Railway & Light Company, Toledo, is about to close an order for a round tonnage, its inquiry being for 1700 tons of 100-lb. standard sections. In structural lines considerable new work is being figured on. The American Bridge Company has taken 600 tons for bridge work for the Wheeling & Lake Erie Railroad. The contract for 4000 tons for the plate mill for

The Otis Steel Company's new plant will probably be placed in a few days. For early delivery Eastern mills are still taking orders in this market at 1.60c. for plates and 1.65c. for structural material. The demand for steel bars for reinforcing purposes has improved with the approach of spring, and makers have advanced prices \$1 a ton to 1.50c. for carload lots and 1.55c. for less quantities. Sheet specifications are good and mills are able to get a premium of \$2 a ton over regular prices for galvanized sheets for delivery in six to eight weeks. Sheet makers have added \$2 a ton to the extra price for black cold rolled sheets for enameling stock and for milk can and show case stock. The demand for iron bars is good; local mills are now able to make fairly good deliveries on small sizes. Iron bar prices are unchanged at 1.65c. to 1.70c., Cleveland. Jobbers continue to quote 2.10c. for steel bars out of stock and 2.25c. for plates and structural material.

Old Material.—The demand has improved, although the market is not active. The increased demand is largely in steel making scrap and cast borings. Mills are taking shipments on contracts freely. Prices are weak but quotations generally are unchanged. A local mill is taking new heavy melting stock at about \$13.75. The railroad offerings this week include lists from the Pennsylvania Lines West and Erie Railroad. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton.	
Old steel rails, rerolling	\$14.50 to \$15.00
Old iron rails	16.00 to 16.50
Steel car axles	18.75 to 19.25
Heavy melting steel	12.75 to 13.00
Old carwheels	15.00 to 15.50
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	12.00 to 12.50
Railroad malleable	13.50 to 14.00
Light bundled sheet scrap	11.50 to 12.00

Per Net Ton.	
Iron car axles	\$21.00 to \$21.50
Cast borings	6.50 to 7.00
Iron and steel turnings and drillings	6.50 to 7.00
Steel axle turnings	9.00 to 9.25
No. 1 busheling	11.50 to 12.00
No. 1 railroad wrought	13.50 to 14.00
No. 1 cast	12.50 to 13.00
Stove plate	10.00 to 10.50
Bundled tin scrap	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, March 5, 1913.—(By Telegraph.)

Pig Iron.—A few holders of both Southern and Northern resale iron continue trying to force the market, but without any definite result so far. Prices for spot shipment have been made as low as \$13, Birmingham, and \$16, Ironton basis, but buyers are holding off and little has changed hands even at these figures. However, the limited tonnage to be obtained at prices named does not justify any change in regular quotations of \$13.25, Birmingham, and \$16.25 Ironton. Sales by regular furnace agencies are slightly in excess of last week. An Ohio melter bought 600 tons of Southern No. 2 foundry iron at \$13.50, Birmingham, for July-December shipment. A smaller tonnage was taken by a Michigan consumer at the same figure for second and third quarters. There is another recorded sale of Southern No. 3 for nearby delivery at \$12.75. Not much low grade iron is to be had in either markets, but the Northern furnaces probably have more on hand than those in the South, due to their inability to secure high-grade coke several months ago. A Central Western firm is inquiring for 500 tons of low phosphorus iron for last half shipment and a southern Ohio melter wants a like quantity of Southern No. 4 foundry. There are also the usual number of inquiries for small tonnages for delivery over the remainder of the first half. As the consumption is keeping pace with production, the majority of furnace operators feel that circumstances warrant them in sitting tight for a while at least. Both malleable and basic are equally as dull as foundry iron. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft	\$17.00 to \$17.50
Southern coke, No. 2 foundry and 2 soft	16.50 to 17.00
Southern coke, No. 3 foundry	16.50 to 17.00
Southern, No. 4 foundry	16.25 to 16.75
Southern gray forge	16.00 to 16.50
Ohio silvery, 8 per cent. silicon	20.70 to 21.20
Southern Ohio coke, No. 1	17.95 to 18.45
Southern Ohio coke, No. 2	17.45 to 17.95
Southern Ohio coke, No. 3	17.20 to 17.45
Southern Ohio malleable Bessemer	17.45 to 17.95
Basic, Northern	17.95 to 18.45
Lake Superior charcoal	19.25 to 19.75
Standard Southern carwheel	27.25 to 27.75

(By Mail)

Coke.—There is now a wide range of difference between furnace and foundry coke in all three fields. In all districts 48-hr. brands are being quoted from \$2.40 to \$2.75 per net ton at oven, for either spot or forward delivery. Foundry coke is quoted at \$3.25 to \$3.75. There is very little new business, but shipments on contracts are good. The absence of any new demand, together with the increasing production reported, precludes any opportunity for an early advance in prices.

Finished Material.—The sheet, bar and structural mills are still behind on deliveries, about 10 weeks or more; in fact, all classes of finished material are hard to get on time. We quote steel bars at 1.40c. for forward delivery and around 1.45c., Pittsburgh basis for nearby shipment, although it would be difficult to place any large sized order at the last named figure. Structural shapes are quoted at 1.45c. to 1.50c. Pittsburgh, with all kinds of premiums offered on some specifications. Railroad track spikes are quoted at from \$1.85 to \$1.90 per 100 lb., Pittsburgh.

Old Material.—Although the rolling mills and foundries are using much scrap iron and steel, the quantity offered dealers is ahead of consumption, and prices are very weak, having been reduced about 25c a ton on all grades. The minimum prices given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum figures are dealers' quotations f.o.b. at yards:

Per Gross Ton.	
Bundled sheet scrap	\$10.25 to \$10.75
Old iron rails	13.75 to 14.25
Relaying rails, 50 lb. and up	20.75 to 21.25
Rerolling steel rails	12.75 to 13.25
Melting steel rails	10.75 to 11.25
Old carwheels	12.50 to 13.00

Per Net Ton.	
No. 1 railroad wrought	\$10.75 to \$11.25
Cast borings	6.75 to 7.25
Steel turnings	7.25 to 7.75
No. 1 cast scrap	10.50 to 11.00
Burnt scrap	7.50 to 8.00
Old iron axles	18.00 to 18.50
Locomotive tires (smooth inside)	11.75 to 12.25
Pipes and flues	7.25 to 7.75
Malleable and steel scrap	9.00 to 9.50
Railroad tank and sheet scrap	6.00 to 6.50

Birmingham

BIRMINGHAM, ALA., March 3, 1913.

Pig Iron.—In spite of reports of greater briskness in inquiries, the market continues to sag, with resale metal offered at \$13 to \$13.50 and furnace iron at \$13.50 for early shipment. J. C. Maben, president Sloss-Sheffield Steel & Iron Company, says his company has sold 15,000 tons of iron on the \$13.50 basis. Brokers assert that all the quick delivery iron wanted can be secured at \$13.50. The furnace men admit that the future must take care of itself and that they may be obliged to conform to the lead of the merchant sellers and the Tennessee furnaces. Production continues at the maximum rate of January and February and shipments also are heavier than they have been in some time. In some quarters it is asserted that the resale iron has largely disappeared, but its effect is still felt. The basic iron output is larger than it has ever been, but it is consumed at home in the mills of the Tennessee and Standard (Southern) Steel companies. Manufacturers are more inclined to yield to the lower basis than heretofore. With the lowest figure representing resale merchant iron and the highest second half or third quarter delivery, prices f.o.b. cars Birmingham are as follows:

No. 1 foundry and soft	\$13.50 to \$14.50
No. 2 foundry and soft	13.25 to 14.00
No. 3 foundry	13.00 to 13.50
No. 4 foundry	12.50 to 13.00
Gray forge	12.00 to 12.50
Basic	13.50 to 14.00
Charcoal	25.00 to 25.50

Cast Iron Pipe.—The pipe foundries are continuing operations on the usual scale with small orders for extensions and repairs coming in freely, but with no large requirements actually in sight. Prices are maintained for small orders, but large ones would doubtless be accepted at a considerable shading in sympathy with the pig iron market. Quotations are continued at \$24.50 for 4 in. and \$22.50 for 6 in. and upward, with \$1 added for gas pipe.

Coal and Coke.—Coal is being mined on a large scale and the tonnage is taken care of. Coke is a trifle easier, but the demand is greater than the supply and prices have not suffered much for that reason.

Old Material.—Light cast and steel scrap have been

disposed of in considerable quantities by dealers. Probably 2000 tons were sold at \$11.50 for steel and \$11 for cast. Prices are as follows, per gross ton, f.o.b. cars at dealers' yards:

Old iron axles	\$15.50 to \$16.00
Old steel axles	15.50 to 16.00
Old iron rails	14.00 to 14.50
No. 1 railroad wrought.....	12.50 to 13.50
No. 2 railroad wrought.....	10.50 to 11.50
No. 1 country wrought.....	10.00 to 10.50
No. 2 country wrought.....	9.00 to 9.50
No. 1 machinery cast	10.50 to 11.00
No. 1 steel scrap.....	11.00 to 11.50
Tram car wheels.....	11.00 to 11.50
Standard car wheels.....	12.50 to 13.00
Light cast and stove plates.....	9.00 to 9.50

San Francisco

SAN FRANCISCO, CAL., February 25, 1913.

Finished products for which orders were placed several months ago are still arriving freely, and deliveries on new business are coming through in better shape than for some time. Spot supplies are accordingly in good shape, and merchants are specifying only enough to keep stocks sorted up. While a few good-sized individual orders have been placed, general requirements have increased but little this month, country demands having been curtailed by lack of rain, though renewed activity is expected after this week's showers. The general coast outlook is favorable, but buyers are disposed to limit purchases as far as they can with safety.

Bars.—Current business in twisted and corrugated bars continues heavy, with several large inquiries in prospect for the next month, and the various coast mills are keeping their output of such products sold up at good prices. The consuming demand for soft steel bars from the small trade has been somewhat restricted, and while a few large buyers have been in the market, jobbers' specifications are light. There is still a heavy tonnage in store, with arrivals nearly covering current needs. Jobbing prices are maintained as before at 2.75c. for steel and 2.65c. for iron.

Structural Material.—Several local shops are still short of work, but the situation is gradually improving, and several new contracts are expected within the next few weeks. A considerable tonnage has recently been let in the north coast cities and Los Angeles, and several important jobs are still to be figured at the latter city. Plans are expected in about six weeks for another wharf in this city requiring some structural work. A small contract has been let for structural fittings and channel ties for the Machinery Hall, and the Central Iron Works has taken a contract on a tonnage basis for a Catholic church at Sixteenth and Dolores streets. Nothing has yet been given out in regard to the Subtreasury steel work. The First Trust & Savings Bank, Oakland, is having plans drawn for an 11-story class A building at Sixteenth street and San Pablo avenue, and the Aronson Realty Company plans a large building at Mission and New Montgomery streets. The town of Santa Rosa, Cal., has taken figures on a small tonnage for a city hall. Fabricators still have difficulty in getting deliveries, but some mill agents offer plain material for prompt shipment on a basis of 2.55c., San Francisco. They report considerable business at this figure north and south, but little locally.

Rails.—Single orders are still small, with buying apparently limited to immediate needs, but the aggregate tonnage of both light and standard sections is satisfactory. There is considerable talk of new lines and extensions, and several surveys are under way, but the larger inquiries expected are slow to appear.

Sheets.—The consuming demand is keeping up well and some new business is coming from the larger manufacturing interests, but jobbers are buying in a limited way, being well covered by former purchases. Some mill agents are booking a fair tonnage in black and galvanized sheets, on which they offer early delivery, but shipments of hard red and blue annealed sheets are subject to considerable delay.

Plates.—The Associated Oil Company has placed a contract with the Western Pipe & Steel Company for 25 oil tanks of 55,000 bbls. capacity each, to be built near Martinez, Cal. The latter company also has a contract for a 36-in. siphon for the Bear Valley Mutual Water Company near San Bernardino, Cal. Mill agents report a very good tonnage of the lighter gauges, though jobbing trade is quiet and merchants show little interest.

Merchant Pipe.—A little improvement is noted in the oil fields, and the jobbing movement in the country

continues heavy, though local plumbing supply firms report business quiet. Stocks are too heavy to require much buying on the part of merchants.

Cast Iron Pipe.—The tonnage has increased somewhat, though few large inquiries are in the market at present. The United States Cast Iron Pipe & Foundry Company has taken a small order at Pasadena, Cal. The San Gabriel Water Company, Alhambra, Cal., has taken figures on a lot of pipe, and the town of San Bernardino has just received bids on a fair tonnage. An order has been placed by the Los Angeles Gas & Electric Company, and the volume of small scattering orders is well maintained.

Pig Iron.—While some importers still have a little iron in store, spot supplies are steadily diminishing, and a good tonnage of Southern foundry and other domestic grades is being ordered for prompt shipment. Melters, however, are proceeding rather cautiously, and no heavy tonnage has been ordered for extended delivery. With the depletion of old accumulations at the foundries an increasing demand is expected. No. 2 Southern foundry iron for prompt delivery is quoted at \$24.60, and second quarter at \$25 per gross ton.

Coke.—The larger consumers are still fairly well supplied, and little interest is taken in either foreign or domestic grades, though a fair movement of Southern foundry coke is expected before long. Importers are still quoting \$15.50 per net ton, ex yard.

Old Material.—The comparatively large scale of operations of all consumers of scrap in this vicinity is causing a steady demand in all lines, and with no exceptionally large supplies coming into the market values are well maintained. Prices are quoted as follows: Cast iron scrap, per net ton, \$15.50; steel melting scrap, per gross ton, \$12.50; wrought scrap, per net ton \$12.50 to \$15; reolling rails, per net ton, \$11.

The Pacific Rolling Mill Company has moved its offices from the Crocker Building to 216 Sharon Building, on New Montgomery street, San Francisco.

St. Louis

ST. LOUIS, Mo., March 3, 1913.

The market is dull so far as new commitments are concerned, though there is the same insistence on shipments that has existed for some months and if anything the pressure is growing greater. The spring outlook is generally regarded as very good.

Pig Iron.—There are larger numbers of inquiries for small quantities of pig iron very evidently desired for special purposes or needed to fill out peremptory requirements. There is no disposition to contract beyond the second quarter and as most of the large consumers are already booked for the first half, there is little expectation by representatives here that there will be any active buying in this territory until the consumers are more nearly at the point of actual need. Demand for shipment is as urgent as ever and the volume going forward indicates immediate heavy melting and that when the proper time comes for further contracting there will be a very active time. Sales have been of the 100-ton and carload lot order, but the aggregate shows an increase over previous recent weeks. Inquiries are coming in more freely and they include quite a number of 50-ton and carload lots needs. There are now pending inquiries for 150 tons which can be filled by either Northern or Southern iron and one for 300 tons, half Northern and half Southern. The quotations being made here are \$13.50 to \$14 for No. 2 Southern foundry, Birmingham basis; \$17.50 to \$18 for Chicago No. 2 X and \$16.50 for Ohio iron, Ironton basis.

Coke.—Sales will aggregate something more than 1000 tons in new business, but practically all was of the special requirement order. The movement forward on existing contracts continues very large, showing that it is being used up fast. Virginia 72-hr. and by-product coke are quotable on the Connellsville basis.

Finished Iron and Steel.—Demand for shipment continues to show very heavy consumption, new orders coming in without cessation and in somewhat heavier volume. New business included 170 tons of structural steel for a Kansas City theater, 22 miles of standard section steel rails for a Kansas electric inter-urban railroad and 15 miles of light rails for a lumber road. Structural material is in strong demand, but shipment difficulties are hindering the placing of new business. In bars the consumption is greater than anticipated when contracts were made. The wagon

and agricultural trade is working up to the limit and seeking material accordingly. Track fastenings are in good request for the season. Reports from the architects show that there is considerable work for the spring and a sharper demand for structural is anticipated. The lumber and coal roads are still good consumers of light rails.

Old Material.—There has been a further softening of prices and there is in consequence a further revision downward of considerable extent. This is due to the fact that the rolling and steel mills are keeping out of the market and buying only as they have needs or can snap up an attractive offering, together with the further fact that there are heavy amounts in sight from the railroads. The Missouri Pacific has sent out a list of more than 3000 tons and other roads are expected to offer considerable in the current week. These facts, together with the practical embargo of the mills, leaves the dealers in a pessimistic frame of mind, with no expectations of an immediate rise in prices at this point. The lack of continued severity of weather in this territory has enabled the roads to pick up more scrap than was anticipated, thus keeping the supplies at the maximum. We quote dealers' prices, f.o.b. St. Louis as follows:

Per Gross Ton.	
Old iron rails	\$13.00 to \$13.50
Old steel rails, rerolling	14.00 to 14.50
Old steel rails, less than 3 ft.	12.00 to 12.50
Relaying rails, standard section, subject to inspection	22.50 to 23.50
Old carwheels	15.00 to 15.50
Heavy melting steel scrap	12.00 to 12.50
Frogs, switches and guards cut apart	11.50 to 12.00

Per Net Ton.	
Iron fish plates	\$11.50 to \$12.00
Iron car axles	19.50 to 20.00
Steel car axles	17.00 to 17.50
No. 1 railroad wrought	11.25 to 11.75
No. 2 railroad wrought	11.00 to 11.50
Railway springs	10.00 to 10.50
Locomotive tires, smooth	11.50 to 12.00
No. 1 dealers' forge	8.50 to 9.00
Mixed borings	6.50 to 7.00
No. 1 busheling	10.50 to 11.00
No. 1 boilers, cut to sheets and rings	7.00 to 7.50
No. 1 cast scrap	10.50 to 11.00
Stove plate and light cast scrap	8.00 to 8.50
Railroad malleable	9.75 to 10.25
Agricultural malleable	8.00 to 8.50
Pipes and flues	7.00 to 7.50
Railroad sheet and tank scrap	6.50 to 7.00
Railroad grate bars	7.50 to 8.00
Machine shop turnings	7.50 to 8.00
Bundled sheet scrap	6.75 to 7.25
Wrought arch bars and transoms	14.00 to 14.50
Steel couplers and knuckles	10.00 to 10.50

Buffalo

BUFFALO, N. Y., March 4, 1913.

Pig Iron.—The sales in this market for the week, as far as can be learned, amounted to about 15,000 tons, principally foundry grades. The bulk of this total is made up of two or three orders for special grades and the remainder of carload and smaller orders. The rank and file of users are holding back, evincing little interest. Shipments on outstanding contracts continue to be exceedingly heavy. One producing interest reports the aggregate of its shipments of pig iron for the month of February as about 52,000 tons and for a very wide distribution geographically. Although some few sales made have been on a special basis, they are not of sufficient importance to affect the general scale of market prices. We quote as follows for second quarter and last half, f.o.b. Buffalo:

No. 1 foundry	\$17.00 to \$17.50
No. 2 X foundry	17.00 to 17.25
No. 2 plain	16.75 to 17.25
No. 3 foundry	16.50 to 17.00
Gray forge	16.25 to 16.75
Malleable	17.25 to 17.75
Charcoal, regular grades and analysis	18.00 to 19.00
Charcoal, special grades and analysis	21.75

Finished Iron and Steel.—There has been an increase in inquiry covering last half in all lines of finished products. The pressure is particularly marked on bars and sheets. Contracts are being placed with considerable freedom where mills are willing to entertain the tonnages offered, which are at prevailing prices. Buyers are commencing to realize clearly that to obtain a place on the mill books it is necessary for them to anticipate their purchases for several months, and this they are doing. There have been a number of instances where consumers have placed actual specifications for delivery during the fourth quarter of the year, in order to insure a place in mill schedules. In tin mill sheets there has been an advance of 10c. per 100 lbs., covering enameling sheets, show card and

milk can finishes. In fabricated structural lines a large number of building projects are under way, principally of moderate and small size, which will soon be ready for figures. Bids will soon be taken for a cold storage warehouse 75 x 200 ft., 4 stories, to be erected by C. H. Teicher, Batavia, N. Y., requiring a small tonnage. Bids are to go in on Saturday of this week for the St. Clair street bridge, Toronto, to be erected by the city, requiring 400 tons, and bids are to be received March 18 for two Erie Barge Canal bridges, contract No. 65, requiring nearly 500 tons. The Buffalo Structural Steel Company has been awarded contract for steel work, 100 tons, for the peroxide grinding building to be erected by the Niagara Electro-Chemical Company, Niagara Falls, N. Y. The same company has also been awarded contract for the steel for the Hutchinson high school, Buffalo, 1400 tons. The steel for the rebuilding of the plant of the Powers Specialty Company at Cumminsville, near Dansville, N. Y., 150 tons, has been taken by the American Bridge Company.

Old Material.—Heavy melting steel and old car wheels are about the only commodities that have been active, and these are moving quite freely to users at the prices in effect last week. The remainder of the list is somewhat stagnant, consumers showing little interest. Dealers are not anxious to sell at present prices and are awaiting an advance which they look forward to as likely to occur shortly. Such transactions as are noted in general lines are for material in transit or on cars which have to be moved promptly to save demurrage. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	\$14.00 to \$14.50
Boiler plate, sheared	15.50 to 16.00
No. 1 busheling scrap	12.00 to 12.50
No. 2 busheling scrap	10.00 to 10.50
Low phosphorus steel	17.00 to 17.50
Old iron rails	15.00 to 15.50
No. 1 railroad wrought	14.00 to 14.50
No. 1 railroad and machinery cast scrap	13.75 to 14.25
Old steel axles	17.00 to 17.50
Old iron axles	24.00 to 24.50
Old carwheels	15.75 to 16.25
Railroad malleable	13.25 to 13.75
Locomotive grate bars	11.00 to 11.50
Stove plate (net ton)	9.75 to 10.00
Wrought pipe	10.00 to 10.50
Wrought-iron and soft steel turnings	8.25 to 8.50
Clean cast borings	7.50 to 8.00
Bundled tin scrap	18.00

British Advance Cleveland Iron

Midland Brands of Pig Are Cheaper
and Tin Plate Mills Are Stopping

(By Cable)

MIDDLESBROUGH, ENGLAND, March 4, 1913.

Cleveland pig iron is being strongly manipulated by Glasgow houses trying to squeeze shorts, but Midland brands of pig iron are all cheaper. Efforts to reduce the tinplate output by concerted action having failed, mills are stopping independently; 50 are now idle and others will soon cease operations. The Standard Oil Company has bought 50,000 boxes of oil sizes of tin plates for the East at 14s. 6d. German and Belgian syndicates have opened sales of April to June semi-finished steel at unchanged prices, but British material is cheaper. Stocks of warrant iron are 218,633 tons, against 224,371 tons a week ago. We quote as follows:

Cleveland pig-iron warrants (closing Tuesday) 63s. 6d., against 60s. 3½d. one week ago.
No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 64s., an advance of 3s. 6d.
Steel sheet bars (Welsh) delivered at works in Swansea Valley, £5 10s., a decline of 2s. 6d.
German sheet bars, f.o.b. Antwerp, 112s. 6d.
German 2-in. billets, f.o.b. Antwerp, 107s. 6d.
German basic steel bars, f.o.b. Antwerp, £5 18s., a decline of 1s.
Steel bars, export, f.o.b. Clyde, £8 5s.
Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £7 7s. 6d.
German joists, f.o.b. Antwerp, £5 12s. to £5 15s.
Steel ship plates, Scotch, delivered local yards, £8 7s. 6d.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 15s.
Steel rails, export, f.o.b. works, port, £6 15s.
Tin plates, cokes, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 14s. 1½d. against 14s. 3d. one week ago and 14s. 6d. two weeks ago.

The German Iron Trade Quieter

Exports as Well as Domestic Business
Affected Lower Prices in Other Countries

BERLIN, February 20, 1913.

The quiet, reserved tone in the iron trade continues and has evidently grown more pronounced. Hitherto it was only the home trade that was mentioned as being slow in placing orders for finished material. This week the same tendency appears in the export trade. Prices are weakening more visibly. German steel bars for export have now dropped to 120 marks, f.o.b. Antwerp, and it is also highly probable that plates have also been reduced for the export trade. Belgium reports several days ago were that export plates had been reduced 2 shillings owing to the increased competition from Germany. Otherwise there appear to be few changes in the general situation. Work at mills and furnaces is proceeding with undiminished energy. The demand for ores is very brisk, especially for minettes of the Luxemburg-Lorraine district, but the supplies available to the open market there are so restricted that consumers have been compelled to turn to the producers of richer ores across the French border.

The tendency of pig iron is firm, and calls for delivery of iron already ordered continue of an urgent character. Considerable foreign orders for the second half year have recently been taken by the syndicate. Whether the syndicate will mark up home prices for the next half year will be decided in March. The recent rise of ore prices would warrant higher prices for pig; nevertheless, it is doubtful, in view of the uncertain position of the trade, if they will again be advanced.

Increased Orders for Rails

Consumers of semi-finished steel are still complaining of tardy delivery by the mills, and they are unable to obtain supplementary supplies from the open-hearth plants outside of the Union, their full output having already been disposed of far ahead. The Union will next week fix its prices for the second quarter. No change is looked for. The home business in beams is quiet, but export shipments are still made on a liberal scale, and foreign buyers are calling briskly for shipments. In steel rails the mills are well employed and orders are in hand for a considerable period ahead. The orders from the various German state railroad systems were considerably greater than last year, and the amount of work for foreign markets is quite satisfactory.

In bars, notwithstanding the reduction for export, as mentioned above, the mills are holding pretty firmly to their home scale. The price is 122 to 123 marks, with 1½ per cent. discount. The mills report that orders in hand run for the most part three to four months ahead and that calls for delivery are coming in satisfactorily. Some establishments still stipulate 6 to 8 weeks for delivery from receipt of specifications on orders, but the most of them can make delivery more promptly. Plate mills have orders running far ahead, but new orders are very scarce. This is also the case with wire and rods.

Cooperation in the Tube Trade

Business in tubing has grown quieter. A meeting of the tube manufacturers was held this week to discuss plans for a trade organization. All the establishments were represented, even including the Mannesmann Röhrenwerke, which had hitherto stood aloof from movements of this kind. According to the report of the meeting given to the press a general willingness to take part in a combination was manifested. Nevertheless, it is recognized that there are very grave difficulties in the way of reaching an agreement. A further meeting was appointed for February 28, and in the meantime the promoters of the scheme will try to smooth away obstacles. On the same day a meeting of the international tube convention will be held.

Foreign Iron Markets Affect Stocks

Iron shares have been adversely affected within a week not only by the home conditions described above but also by reductions of prices reported from the United States, England and Belgium. The stock market was also depressed by the statement of an important coal operator indicating that the negotiations looking toward the prolongation of the coal syndicate are in a very bad way, owing to the sharp conflict of interest between the iron companies that own coal mines and the owners of mines operated independently of iron works. This statement more than offset the continued reports of unusually heavy shipments of coal.

Market reviews from Belgium indicate that the trade is growing quieter and the tendency is weaker. The market there has been described as being in a sound position, and it is expected that the demand for iron and steel will grow very heavy as soon as peace in the Balkans is secured. Yet a Brussels dispatch of this evening says that the weakening of prices is assuming more serious proportions, and has now reached the home trade. Iron bars have fallen 2.50 francs and bands 5 francs, while plates of basic steel have been reduced to 177.50 to 182.50 francs.

Boston

BOSTON, MASS., March 4, 1913.

Old Material.—The sentiment in the scrap market is stronger, and the belief is generally held here that the mills must begin buying on a considerable scale in the near future. Prices show no change. Material is not coming out, partly because of the season, and partly because holders are hoping for better prices. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of \$2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	\$10.50 to \$10.75
Low phosphorus steel	13.50 to 14.50
Old steel axles	14.50 to 15.00
Old iron axles	22.50 to 23.00
Mixed shafting	13.50 to 13.75
No. 1 wrought and soft steel	10.75 to 11.00
Skeleton (bundled)	9.00 to 9.50
Wrought iron pipe	10.00 to 10.25
Cotton ties (bundled)	9.50 to 9.75
No. 2 light	4.00 to 4.50
Wrought turnings	7.50 to 7.75
Cast borings	7.50 to 7.75
Machinery, cast	13.50 to 14.00
Malleable	10.50 to 11.00
Stove plate	8.50 to 9.00
Grate bars	7.50 to 7.75
Cast-iron car wheels	15.00 to 15.50

New York

NEW YORK, March 5, 1913.

Pig Iron.—The sentiment is undoubtedly better and there is more inquiry. Transactions have not been heavy, however, apart from sales of pipe iron in Virginia. These have amounted to upward of 10,000 to 15,000 tons. On one lot of 5000 tons, silicon 1.75 to 2.25 per cent., the price was \$15 at furnace, deliveries to begin at once. A large interest which buys in New York has taken 5000 tons of Southern iron for a Chicago plant. A sale of 800 tons of foundry iron to a Hudson valley consumer is reported and a number of sales of several hundred tons each, including one of 500 tons of low phosphorus iron. The recent inquiry by a New England machinery foundry amounting to several thousand tons has for the most part been satisfied. In this case a considerable amount of high phosphorus iron was wanted, in addition to a purchase of such iron made by the same interest a short time ago. No large sales were reported by Buffalo furnaces but there are evidences that \$17 at Buffalo furnace for No. 2 would be shaded for Eastern shipment. In eastern Pennsylvania No. 2 X can probably be had at close to \$17 at furnace. It is to be noted that with the increased inquiry there has developed more of a disposition by furnace companies to make concessions. We quote as follows for Northern iron at tidewater: No. 1 foundry, \$18 to \$18.25; No. 2 X, \$17.75 to \$18; No. 2 plain, \$17.50 to \$17.75. Southern iron is quoted at \$18 to \$18.50 for No. 1 foundry and \$17.50 to \$18 for No. 2.

Structural Material.—While there is little if any pessimism noticeable, buyers are playing a waiting game and another week has passed with few large closures of structural material contracts. Fabrication and erection prices showed added evidence of the search for business to keep organizations intact and it is expected that some of the large work now pending will go at figures around \$55 a ton erected. There is more small railroad bridge work in the market than for some time. Recent contracts include 850 tons for the Widener library, Cambridge, Mass., to the American Bridge Company; 400 to 800 tons, according to final decision as to number of tracks, for the Central Railroad of New Jersey at Catasauqua, Pa., also to the American

Bridge Company; 225 tons for an addition to the Hotel Gude, New Haven, to the Berlin Construction Company, and 200 tons for an extension to the plant of the J. B. Brill Company, to the Keystone Structural Company, Philadelphia. It is understood that the New Haven has closed for close to 800 tons for bridge work. The Boston & Maine has an additional tonnage pending, totaling now close to 1000 tons; the Lehigh is inquiring for 500 tons; the New York Central at Peekskill, including a lift bridge, for 200 tons and the West Shore for a pier for 425 tons. A loft building requiring 600 tons, on West Twenty-fifth street, is also reported in the market. Plain material obtains 1.76c. for mill shipments for delivery in eight to ten weeks, but 1.61c. to 1.66c. New York, for delivery in the third quarter. From store the price is 2.15c., New York.

Plates.—A decreasing demand is indicated in the decidedly better deliveries from eastern Pennsylvania mills, which, however, still ask \$2 to \$3 more a ton than the prevailing Pittsburgh price. Plates, both universal and sheared, are obtainable in three weeks, but demand is still dull in this market, nor is there any added buying of cars by the railroads, though more inquiries have developed. The Baltimore & Ohio is now asking for bids on 1000 steel freight cars and the Boston & Maine on 5000 cars, mostly box. Other inquiries in addition to those already mentioned in this column in recent weeks include 300 box, 160 freight and 6 caboose for the Norfolk & Southern; 1500 to 1800 box, phosphate and gondolas for the Seaboard Air Line; 50 dump cars for the Southern Pacific; 51 miscellaneous cars for the Carnegie Steel Company; 300 ballast cars for the Chicago & Western Indiana; 201 passenger cars for the Harriman Lines; 307 passenger cars for the Pennsylvania, and 85 passenger cars for the Pennsylvania Lines. The Michigan Central, it is understood, is to build 4000 cars in the New York Central shops at East Rochester, extended over quite a period, and the American Bridge Company, it is believed, will supply fabricated portions for 400 of these cars in the early future. There is considerable passenger equipment in the market in addition to that mentioned, as enumerated in recent issues and the Buffalo, Rochester & Pittsburgh is still regarded as a purchaser of 1000 gondolas and 350 underframes, if its prices are met. Quotations are 1.61c. to 1.66c., New York, for mill shipments in the third quarter and 1.76c. for shipment in four weeks, with \$1 a ton additional for universal plates.

Bars.—Specifications on contracts continue heavy, one steel works representative indeed stating that demand is heavier than ever. Bar iron is, however, much easier, one mill at least supplying material in less than one week. Another mill still reports heavy orders, though not so great as in the latter months of 1912, and has closed on a considerable tonnage for second quarter at 1.70c. mill, equivalent to 1.80c. New York. Steel bars are quoted at 1.40c., Pittsburgh, or 1.56c., New York, delivered at the convenience of the mill, which is commonly more than three months hence, but they are 2.05c. from store. Refined iron bars are quoted at 1.70c. to 1.80c., New York, and from store are 2.15c.

Ferroalloys.—There is a moderate demand for 80 per cent. ferromanganese, the largest active inquiry being one for about 150 tons. Quotations are unchanged at \$65, Baltimore, for both early and forward delivery. The resale lots which were on the market recently are understood to have been taken up. The demand for 50 per cent. ferrosilicon continues quiet at \$75, Pittsburgh, for carloads, \$74 for 100 tons and \$73 for 600 tons. There has been some business in small lots.

Cast Iron Pipe.—The city of Reading, Pa., opened bids March 4 for 340 tons of 6 to 16-in. Public lettings appear to be getting fewer, while private buying is about normal for the season. The expectation of lower prices on pig iron is probably causing some of the pipe makers to name lower prices on such contracts as are coming up. Quotations on carload lots of 6-in., however, appear to be maintained at \$24 to \$25 per net ton, tidewater.

Old Material.—The movement of steel scrap and rolling mill stock on contracts is heavy, and consumers are therefore so well supplied that they are again exceedingly critical as to the quality of the material they are receiving. Rejections are numerous. The over-shipment on any contract gives dealers much trouble, as consumers appear to be unwilling to take any even at considerable concessions on the contract price. The situation from the dealers' standpoint is exceedingly unsatisfactory. Buying by consumers is exceedingly limited while the quantity of old material coming on

the market is excessive. Railroads and other scrap producers continue to make large offerings, and therefore the trend of the market is toward steadily diminishing prices. The foundries are doing little in the scrap market, being evidently influenced by the weakness in pig iron. Dealers' quotations are as follows, per gross ton, New York and vicinity:

Old girder and T rails for melting	\$10.00 to \$10.50
Heavy melting steel scrap	10.00 to 10.50
Relaying rails	22.00 to 22.50
Rerolling rails (nominal)	14.00 to 14.50
Iron car axles	24.00 to 24.50
Old steel car axles	16.00 to 16.50
No. 1 railroad wrought	12.50 to 13.00
Wrought iron track scrap	12.00 to 12.50
No. 1 yard wrought, long	11.00 to 11.50
No. 1 yard wrought, short	10.00 to 10.50
Light iron (nominal)	4.50 to 5.00
Cast borings	7.25 to 7.75
Wrought turnings	7.50 to 8.00
Wrought pipe	9.75 to 10.25
Old car wheels	14.00 to 14.50
No. 1 heavy cast, broken up	11.25 to 11.75
Stove plate	8.75 to 9.25
Locomotive grate bars	8.00 to 8.50
Malleable cast	11.00 to 11.50

Crocker Brothers, 99 John street, New York, announce that they have resumed relations with the Emporium Iron Company, Emporium, Pa., as sole agents for the sale of its foundry iron.

Metal Market

NEW YORK, March 5, 1913.

The Week's Prices

Cents Per Pound for Early Delivery.								
	Copper, Lake.	New York. Electro- lytic.	Tin, New York.	Lead, New York.	St. Louis.	Spelter, New York.	St. Louis.	
Feb. 27.....	15.00	14.75	47.50	4.35	4.20	6.25	6.10	
28.....	15.00	14.75	47.55	4.35	4.20	6.25	6.10	
Mar. 1.....	15.00	14.75	.....	4.35	4.20	6.25	6.10	
3.....	15.00	14.87½	47.75	4.35	4.20	6.25	6.10	
4.....	15.00	14.87½	48.00	4.35	4.20	6.35	6.20	
5.....	15.00	14.87½	48.50	4.35	4.20	6.35	6.20	

Because of a better demand from abroad, copper is stronger. Steady business has been done in tin, and the price is practically unchanged. Lead shows a little better tone. Spelter is higher. Antimony has continued irregular and the range of prices has changed but little.

New York

Copper.—The market has improved because of a better demand from abroad and resultant sales. Most of the selling agencies have done business with foreign consumers and some of the transactions were of good proportions. It is generally agreed that the clearing up of the European political situation is the cause of the greater activity on the other side and the buying is expected to continue as affairs progress toward a normal basis. The better business is reflected in the higher prices for electrolytic, which is now quoted at 15c., delivered, 30 days, for prompt metal, and 14.87½c. cash, New York. Early delivery copper is rather closely held. American buyers have not entered the market to any considerable degree as they are well fixed in the matter of early shipments, but they are not so well provided for future deliveries and must appear in the market before long. The February statistics of the Copper Producers' Association, which are to be issued March 7, are expected to show a substantial falling off in production, fairly good deliveries and a smaller addition to surplus stocks than has been the rule of late. In the first two months of this year exports showed a decrease of 14,854 tons as compared with the same period of last year. February exports amounted to 26,567 tons. London quotations to-day were £65 17s. 6d. for spot and £66 2s. 6d. for futures. Exports this month total 6105 tons.

Copper Averages.—The Waterbury average for the month of February was 15.50c. The average New York price for Lake copper, based on daily quotations in *The Iron Age*, was 15.55c. and for electrolytic, 15.35c.

Pig Tin.—On the surface this market has been quiet, but a fair steady business was going on every day. The buying was almost exclusively for future delivery and on the basis of London prices plus the cost of landing in New York. Price cutting was absent. In prompt shipment metal very little business was done for the reason that consumers are well covered. The quotation for spot tin in the London market to-day was £220 10s. and for futures £217 5s., spot tin being £2 higher than yesterday. The New York price is 48.50c. for prompt delivery. Throughout the week the London market

has continued to show its erratic tendency. The arrivals have been 445 tons and there is afloat 4299 tons. Deliveries into consumption in February were 3500 tons, or 200 tons less than in the previous month. The total deliveries for January and February showed a decrease of 550 tons, as compared with the same time last year. The total visible supply February 28 was 12,304 tons, or 2692 tons less than that of February 29, 1912.

Lead.—A slight improvement developed in certain brands of lead which imparted a better tone to the metal generally. Otherwise conditions are unchanged and the market is quiet. The New York price is 4.35c. and that in St. Louis, 4.20c. At this season preparations are usually being made for meeting the spring demand, but conditions are different at the present time, partly because of the open winter which has permitted a great deal of outside work, usually not done until later, while uncertainty as to the tariff has had the effect of restraining buying activity.

Spelter.—Although no definite reason was advanced for the move, several interests in whose hands the supply of prompt delivery spelter is pretty well centered advanced prices March 4 and quotations now are 6.35c. to 6.40c. New York, and 6.20c. to 6.25c. St. Louis. There is a feeling in the trade that still higher prices may soon be reached. Foreign advices, which have been confirmed, state that American spelter has been sold in Europe at the equivalent of 5.44c. c.i.f. British ports. This is metal refined from Mexican ore which is allowed a drawback duty on being exported.

Antimony.—The market is quiet and its irregularity has continued. Quotations are 9c. to 9.25c. for Cookson's, 8.62½c. to 8.75c. for Hallett's, and 8c. for Chinese and Hungarian grades.

Old Metals.—The market is lifeless. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible	14.75 to 15.00
Copper, heavy and wire	14.00 to 14.25
Copper, light and bottoms	12.75 to 13.00
Brass, heavy	9.25 to 9.50
Brass, light	7.75 to 8.00
Heavy machine composition	13.00 to 13.25
Clean brass turnings	8.50 to 8.75
Composition turnings	11.50 to 12.00
Lead, heavy	4.00
Lead, tea	3.75
Zinc, scrap	5.25

Chicago

MARCH 4.—With the exception of the somewhat erratic fluctuations in tin prices and a rather wide range of quotations for spelter the metal market for the past week has held fairly steady. Old metal prices, which have been lower and weak, have regained a measure of firmness. We quote as follows: Casting copper, 15c.; Lake, 15.50c., in carloads for prompt shipment; small lots, ¼c. to ¾c. higher; pig tin, carloads, 49c., small lots, 51c.; lead, desilverized, 4.30c. to 4.35c. for 50-ton lots; corroding, 4.55c. to 4.60c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 6.25c. to 6.30c.; Cookson's antimony, 10.50c., and other grades, 9.75c., in small lots; sheet zinc is \$8.25, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 13c.; copper bottoms, 11.75c.; copper clips, 12.75c.; red brass, 12c.; yellow brass, 9c.; lead pipe, 3.80c.; zinc, 4.50c.; pewter, No. 1, 33c.; tinfoil, 37c.; block tin pipe, 44c.

St. Louis

MARCH 3.—Prices are fairly well held at the quotations for 10-day, which follow: Lead, 4.22½c. to 4.25c.; spelter, 6.07½c. to 6.10c.; tin, 47.60c. to 47.75c.; Lake copper, 15.60c.; electrolytic copper 15.35c.; antimony, Cookson's, 9.85c. to 10.10c. In the Joplin ore market the attitude of the producers in restricting the amount of ore raised has failed to stiffen prices, and quotations for 60 per cent. zinc blende only reached \$48 per ton for the maximum basis range, while the minimum was \$45. The top price paid for the choicest lots was \$51. Comparatively, the prices the past week were the same as in the corresponding week last year, but they were not so firmly held. Calamine, which is always more or less affected by weather conditions, since it comes from the shallow diggings, was quotable at a range of \$24 to \$26 per ton for 40 per cent., with the top price for choicest lots \$33. Lead ore was very little changed, the price standing at \$52.50 for 80 per cent. We quote miscellaneous scrap metals as follows: Light brass, 5.50c.; heavy brass and light copper, 9c.; heavy copper and copper wire, 11c.; zinc, 4c.; lead, 3.50c.; tea lead, 3c.; pewter, 25c.; tinfoil, 36c.

Iron and Industrial Stocks

NEW YORK, March 5, 1913

A more cheerful feeling dominated the stock exchanges the past week. The combination of unfavourable influences which had for some time operated cumulatively to depress values of stocks appears to have run its course. The only remaining influence of a specially unfavorable character has been the demand for money in Europe, which has some effect on this side of the Atlantic and probably prevents stocks from advancing as much as they would have done otherwise. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Am. Can., com.	32½-39¼	Pressed Steel, com.	24¼-28
Am. Can., pref.	120½-126½	Pressed Steel, pref.	97-98
Am. Car & Fdy., com.	47½-51¼	Railway Spring, com.	28¾-29
Am. Car & Fdy., pref.	116-116½	Railway Spring, pref.	100
Am. Loco., com.	34¼-37	Republic, com.	23¼-25¼
Am. Loco., pref.	104¼-105	Republic, pref.	84-85
Bald. Loco., com.	46¾-49¼	Rumely Co., com.	68-72
Bald. Loco., pref.	104¼	Rumely Co., pref.	92
Beth. Steel, com.	35¼-37¼	Pipe, com.	13¼-14
Beth. Steel, pref.	63¾-67¼	Pipe, pref.	55
Case (J. I.), pref.	100¼	U. S. Steel, com.	60-63
Colorado Fuel	31¼-35¾	U. S. Steel, pref.	107¼-108¼
Deere & Co., pref.	97¼-98¼	Va. I. C. & Coke	45-51
Emery-Brant, com.	56½-57¼	Westinghouse Elec.	68¼-70¼
General Electric	136-140	Chic. Pneu. Tool	49¼-50¼
Gr. N. Ore Cert.	34-36¼	Cambria Steel	49¼-53¼
Int. Harvester, com.	107-108	Lake Sup. Corp.	26-28
Int. Harvester, N. J.	109	Pa. Steel, pref.	93
Int. Harvester, pref.	112	Warwick	10¼
Int. Pump, com.	12¾-14¾	Crucible Steel, com.	15¼-16
Int. Pump, pref.	53½-54¾	Crucible Steel, pref.	91¼-93
Lackawanna Steel	42¾-44	La Belle Iron, com.	48¼
Nat. En. & St., com.	14¼-16¼	La Belle Iron, pref.	123-126

Dividends Declared

The Railway Steel Spring Company, regular quarterly, 1¼ per cent. on the preferred stock, payable March 20.

The Safety Car Heating & Lighting Company, regular quarterly, 2 per cent., payable April 1.

The Underwood Typewriter Company, regular quarterly, 1¼ per cent. on preferred and 1 per cent. on the common stock, payable April 1.

The American Can Company, regular quarterly, 1¼ per cent. and extra 24 per cent. on back dividends on the preferred stock, payable April 1. This will leave only 8¾ per cent. of the total of back dividends unpaid.

The American Car & Foundry Company, regular quarterly, 1¼ per cent. on the preferred and ½ of 1 per cent. on the common stock, payable April 1.

The Chapman Engineering Company, Mt. Vernon, Ohio, has recently sold its 10-ft. rotary gas producers to the following: Bethlehem Steel Company, six for open-hearth plant at South Bethlehem, Pa.; Tremont Nail Company, three for open-hearth plant at West Wareham, Mass.; Granby Mining & Smelting Company, one for Rose-lake, Ill.; Quebec & St. Maurice Industrial Company, one for LaToque, Que.; Sandusky Portland Cement Company, one for York, Pa.; Crucible Steel Company of America, one for Syracuse, N. Y.

The Warren City Tank & Boiler Company, Warren, Ohio, states that it is making arrangements to build immediately a temporary shop which will be placed in operation at the earliest possible date and which will be operated night and day. This shop will be of sufficient capacity to take care of the company's customers until it erects a new plant either at Warren or whatever point may hereafter be decided upon. The new plant will replace the one burned February 24. Until the completion of the temporary plant the company's most pressing orders will be taken care of by other shops with which it has made arrangements.

The American Fire Resisting Cement Company, Buffalo, N. Y., has erected a building 30 x 100 ft. and is installing machinery for the manufacture of a new product to be sold to iron and steel manufacturers as a lining for furnaces in which high temperatures must be resisted and in which firebricks do not give as satisfactory results as desired. H. T. Upson, of the Pease Oil Company, is president of the new company.

The Brier Hill Steel Company, Youngstown, Ohio, has placed a contract with the Morgan Engineering Company, Alliance, Ohio, for a 150-ton electric Morgan stripper. It has also bought a locomotive.

Personal

G. Seixas, general manager of sales of the Allegheny Steel Company, Brackenridge, Pa., has removed his headquarters from Brackenridge to the offices of Chandler & Floyd, 90 West street, New York City, who are the Eastern representatives of the company.

John T. Gardner, formerly connected with the operating department at the Ohio works of the Carnegie Steel Company, Youngstown, Ohio, has been made superintendent of rolling mills of the Brier Hill Steel Company, in the same city.

In addition to his duties as secretary and treasurer of the Harrisburg Pipe & Pipe Bending Company, W. S. Hildrup has been elected general manager and will have charge of sales and purchases. J. Harvey Patton retains the presidency and D. E. Tracy is general superintendent in charge of furnaces.

William Rufus Reitzell, in charge of the service department of the Riter-Conley Mfg. Company, Leetsdale, Pa., has also been placed in charge of advertising.

R. E. Daniels, who has been with the American Sintering Company at Chicago for some years, has taken charge of the company's plant at Hubbard, Ohio, succeeding Charles H. Settel, deceased.

Henry M. Reed, manager of the Louisville plant of the Standard Sanitary Mfg. Company, has been promoted to the post of assistant general manager of all the company's plants, with headquarters in Pittsburgh. He will be succeeded at Louisville by Theodore Mueller, who has been assistant manager.

J. E. McCauley has been appointed assistant general manager of the works of the Birdsboro Steel Foundry & Machine Company, Birdsboro, Pa. He was formerly sales agent, and has been with the company about four years, going there from the Solid Steel Casting Company. He had previously been employed by the Baldwin Locomotive Works and the Standard Steel Works Company.

A. H. Tuechter, president Cincinnati Bickford Tool Company, Cincinnati, has returned from a five weeks' trip to Panama.

Appointments effective March 1 have been made at the Homestead works of the Carnegie Steel Company as follows: W. E. Crouch, assistant superintendent of the plate department; W. M. Menk, assistant superintendent of the 32, 72, 84 and 140-in. mills; C. L. Flohr, assistant superintendent of the 30, 42 and 128-in. mills; C. P. Laird, assistant superintendent of the 48-in. mill; S. T. Paisley, superintendent of the 28 and 38-in. blooming mills, and E. G. Crozer, assistant superintendent of the structural mills.

Max R. Schwer, formerly with the Colorado Fuel & Iron Company, has been appointed manager of the Pueblo Machine & Foundry Company, Pueblo, Col., succeeding F. P. Lannon, resigned.

Joseph J. Bennet has been appointed assistant purchasing agent of the Illinois Central Railroad, with offices in Chicago.

E. R. Hamilton, Bloomington, Ill., has acquired an interest in the Northwestern Steel & Iron Works, Eau Claire, Wis., and becomes a director and associate manager.

William C. Springer, general night superintendent of the Solvay Company's Milwaukee works, has resigned to accept the position of superintendent of the new coke works now being constructed by the Northwestern Iron Company in conjunction with its furnaces at Mayville, Wis.

Leon de Tissandier, formerly county surveyor for Winnebago County, Ill., has been appointed chief engineer for the Independent Harvester Company, Plano, Ill., in charge of building construction and plant layout.

E. L. Henderson, Carrollton, Ohio, has purchased a controlling interest in the Means Engineering & Foundry Company, Toronto, Ohio. He is president of the Carrollton Pottery Company and interested in a number of other industrial enterprises.

James Inglis, president and general manager American Blower Company, Detroit, Mich., has been elected president of the newly formed Canadian Alkali Company, which will establish an alkali plant at Sandwich, Ont.

William B. Shafer, Jr., for some years manager of sales

of the Alfred E. Norton Company, fabricator and erector of structural steel buildings, 105 West Fortieth street, New York, has been elected vice-president of the company.

W. H. Jackson, of the Des Moines Bridge & Iron Works, Pittsburgh, has gone to Panama on a business trip.

George M. Harden, for a number of years treasurer of the Philadelphia Pipe Bending Company, has resigned, having been appointed district sales agent for the General Pipe, Bending & Erecting Company, Pittsburgh, covering certain Eastern territory. This company makes a specialty of fabricated piping material for power plant construction and other purposes. He has established offices at 518 Drexel Building, Philadelphia.

William S. Pilling, of Pilling & Crane, Philadelphia, Pa., will sail March 11 for a month's trip in the West Indies, including a visit to the Panama Canal. Edgar F. Cook, of the Warwick Iron & Steel Company, will join him at Havana on the way south.

H. H. Light, president Lebanon Valley Iron & Steel Company, Lebanon, Pa., has resigned owing to ill health and will spend several months in travel. He will continue to serve as a director and on the executive board of the company. William C. Sproul succeeds him as president.

F. S. Carman became associated with the Osborn Mfg. Company, Cleveland, March 1, as engineer of its molding machine department. He is a well-known mechanical engineer and member of the Cleveland Engineering Society. He has spent much of his time in the past few years in designing and developing various types of molding machines.

Obituary

THOMAS COSGROVE, superintendent of labor and transportation at the Edgar Thomson steel works and blast furnaces of the Carnegie Steel Company at Braddock, one of the Carnegie junior partners, and the oldest employee in point of service at the Edgar Thomson mills, died March 2 at Mercy Hospital, Pittsburgh, following an operation, aged 67 years. He was born in Dunbar, Scotland, and came with his parents to the United States 50 years ago. They first settled in Connecticut and moved to the Pittsburgh district in 1865. He was one of the contractors who built the Pittsburgh, Virginia & Charleston Railroad, now the Monongahela division of the Pennsylvania Railroad. When the land was bought for the erection of the Edgar Thomson plant Mr. Cosgrove was made superintendent of all the labor and held the position continuously ever since. He leaves a widow, four daughters and three sons.

J. HERVEY STERNBERGH, Reading, Pa., died March 3, aged 79 years. Forty-five years ago he established the Reading Bolt & Nut Works, which he developed into a large industry. It was later merged with half a dozen other plants into the American Iron & Steel Mfg. Company, of which Mr. Sternbergh was president for six years. He invented important methods of improving the manufacture of bolts and nuts.

CLEMENT A. DAVISON, one of the founders and a director of the Michigan Malleable Iron Works, Detroit, Mich., died suddenly February 24, at Tucson, Arizona, where he was spending the winter, aged 63 years. He was formerly a partner in the firm of Roehm & Davison, dealers in iron, steel and heavy hardware, and was also interested in many other commercial projects. He was unmarried.

G. JOSEPH UNSOELD, for many years superintendent of the plant of the Detroit Stove Works, Detroit, Mich., died suddenly February 25, aged 68 years. He was stricken at his desk in the Michigan Legislature at Lansing. He leaves a widow.

JOHN C. LEFFERTS, a pioneer in the process of galvanizing metals, died February 26 in the German Hospital, New York City, from a complication of diseases, aged 75 years. He was born in Michigan and had made his home in New York since boyhood. He served in the army in the civil war.

FRITZ A. SCHULZ, Chicago, manufacturer of metal spinning lathes and presses, died February 23 from typhoid pneumonia, following a short illness. He leaves a widow and five children. The business of which he was proprietor will be continued at 4824 West Lake street, although a reorganization will be necessary.

Pittsburgh and Vicinity Business Notes

The Washington Coal & Coke Company, Dawson, Pa., has bought 206 acres of coal lands in Jefferson Township, Fayette County, Pa. The company states it will not build any coke ovens on this property.

The United Engineering & Foundry Company, Pittsburgh, has received an order from the Wisconsin Steel Company, Chicago, for 16, 14, 12 and 8-in. semi-continuous finishing mills, together with the equipment of shears, tables, etc.

Reports that the Pittsburgh Steel Company will build a plant opposite California, Pa., are denied. It has acquired additional coal lands and owns considerable acreage in the Connellsville and other fields. Ovens will be built to supply coke for its two blast furnaces now being built at Monessen, Pa., but it is not probable that construction work on the ovens will be started for a year or more.

The Pittsburgh Emery Wheel Company, Park Building, Pittsburgh, works at Rochester, Pa., has recently erected several new buildings and is now installing equipment that will increase its capacity about 25 per cent. It has recently received several large orders for swinging frame grinding machines, and this department is filled up with work for some time ahead.

The Carbon Steel Company, Pittsburgh, is in the market for a 20-ton magnet handling crane.

The Treadwell Construction Company, Beaver, Pa., has purchased an electric grinder and buffer from the James Clark, Jr., Electric Company, Louisville, Ky.

The Erie Nipple Mfg. Company, Erie, Pa., has been incorporated to manufacture nipples and other plumbing specialties. The incorporators are Charles A. Eaton, Henry W. Davis and Charles C. Eaton.

The Sligo Iron & Steel Company, Connellsville, Pa., has received an order from the United States Government for high grade iron bars for the Boston navy yard, to be used for making anchor chains for battleships.

William Swindell & Brothers, Pittsburgh, are completing two 30-pot Siemens crucible steel melting furnaces for the Henry Disston & Sons, Inc., Tacony, Pa., and are installing additional crucible steel melting furnaces for the John Illingworth Steel Company, Frankford, Pa., and the Atlas Crucible Steel Company, Dunkirk, N. Y. The firm also has a contract for additional gas producers and piping for the Simonds Mfg. Company, Lockport, Pa., as producer gas is used for fuel in all the furnaces instead of oil.

The United States Coal & Coke Company, Gary, W. Va., an identified interest of the United States Steel Corporation, has announced a general advance in wages to its 3000 employees, averaging about 8 per cent., effective March 1. This company furnishes coal for the by-product coke ovens at Gary, Ind., and Joliet, Ill.

Interests connected with the Pittsburgh Piping & Equipment Company, Pittsburgh, have purchased the Hempfield foundry at Greensburg, Pa., and will operate it as a separate undertaking. Contracts have been placed for rebuilding the plant and enlarging it, including a new steel building, 40 x 140 ft., a 60-in. cupola, two 5-ton cranes, a blower and other equipment.

Despite the fact that the price of fuel oil continues high, furnaces for the use of this fuel are still in demand. The Marine Boiler Works Company, Toledo, Ohio, has placed an order with Tate, Jones & Co., Inc., Pittsburgh, for a large plate heating furnace, 13 x 17 ft. inside dimensions, to use oil. This type of furnace can also be arranged for using gas.

The Bessemer Gas Engine Company, Bessemer Building, Pittsburgh, Pa., with works at Grove City, Pa., has received a contract for two 50-hp. engines, to be installed in the Templeton works of the Harbison-Walker Refractories Company, and also for one 100-hp. and one 5-hp. gas engines, direct connected to generator from the Norton Company, Worcester, Mass., for service in Arkansas.

The Orenstein-Arthur Koppel Company, Machesney Building, Pittsburgh, works at Koppel, Pa., has received orders for several hundred cars for use on sugar cane and other plantations in South America; for about 200 cars from coal mining concerns in this country, and for 10 work cars for the Cleveland Railway Company, Cleveland, Ohio, to be used in hauling construction material.

The offices of the Dravo Contracting Company and the

Dravo-Doyle Company, identified interests, have been removed from the Lewis Block to the Diamond National Bank Building, Fifth avenue and Liberty avenue, Pittsburgh, occupying the entire eleventh floor.

The Fort Pitt Spring & Mfg. Company, Pittsburgh, manufacturer of coil and elliptic springs, is completing an addition, 100 x 300 ft., to its plant which is expected to be in operation within the next 30 days.

On account of the shops of the Bessemer & Lake Erie Railroad at Greenville, Pa., being filled with work for some months ahead, that railroad has made a contract with the Greenville Metal Products Company for the repairing of some of its steel cars and the necessary equipment is being installed. It is probable that the Erie Railroad will also have a number of its cars repaired by this company.

The strike of about 800 laborers at the works of the Carnegie Steel Company at Clairton, Pa., which started last week, has been settled, the men receiving an advance of 2½c. per hour, making the rate for common labor 20c. per hour, the same as paid in the other plants of the company in the Pittsburgh district.

The Dravo Contracting Company, Lewis Building, Pittsburgh, has received a contract from the Department of Public Works of the city for the foundations and concrete work of the proposed Bloomfield bridge at a cost of \$86,514.04. The total length of the bridge is about 2000 ft. Plans for the steel work for the superstructure are being made.

The Chas. N. Hays Company, First National Bank Building, Pittsburgh, has recently received orders for horizontal automatic eliminators as follows: One 6-in., Pennsylvania Coal & Coke Company, Cresson, Pa.; one 8 and one 12-in., Connellsville Central Coke Company, Pittsburgh; one 3 and one 5-in., Dunkirk Gas & Coal Company, Pittsburgh; one 6-in., Rochester & Pittsburgh Coal & Coke Company, Punxsutawney, Pa.; one 5-in. for the H. C. Frick Coke Company; one 5, one 6 and one 7-in. vertical, Standard Steel Car Company, Butler, Pa.

At a municipal election held in Sharon, Pa., last week, the proposition to issue bonds for building a municipal lighting plant was defeated.

The H. J. Heinz Company, North Side, Pittsburgh, has prepared plans for an addition to its power plant. This will consist of a new building, 60 x 130 ft., seven stories, of steel, brick and concrete construction. Two stacks, 250 ft. high and 10 ft. in diameter, will be built. The company has placed an order with the Pittsburgh office of the Heine Safety Boiler Company for the installation of five 600-hp. Heine water tube boilers and is in the market for a full equipment of mechanical stokers.

The Westinghouse Air Brake Company, Wilmerding, Pa., will build a new foundry, the main building to be 60 x 300 ft., two stories, of steel and brick construction. The equipment to be installed will include two 5-ton and two 10-ton electric traveling cranes, molding machines and appliances.

The puddling department of the Wheeling Steel & Iron Company, Wheeling, W. Va., which has been idle for some time, was put in partial operation March 3. It was not able to start all its furnaces because of the scarcity of puddlers.

The Pittsburgh & Lake Erie Railroad, Pittsburgh, recently sent out inquiries for about 30 machine tools to be installed in its shops at McKees Rocks, Pa. The list was not generally circulated, and bids were to close March 1.

G. W. English, formerly with the Perry Iron Company, Erie, Pa., has been made general manager of the Zug Iron & Steel Company, Pittsburgh, and has assumed his duties. Charles G. Zug, who died several years ago, was the last general manager. The company makes high grade iron bars, used largely by railroads. It has a sheet mill plant with six hot mills, which has been idle for some time.

The National Tube Company, Pittsburgh, has opened an office in room 420, R. A. Long Building, Kansas City, Mo., which will be under the jurisdiction of the St. Louis office, and has also opened an office in St. Paul, which will be under the jurisdiction of the Chicago office.

The Republic Bank Note Company, Pittsburgh, is taking estimates on the installation of two 125-hp. gas engines to be direct-connected to 75-kw. generators for the power plant in its new building.

ads are being received for the construction of a 16-in. cast iron intake pipe for the water works system of the McIntic-Marshall Construction Company at Rankin, Pa. The work will embrace the laying of 250 ft. of the pipe under the bed of the Monongahela River and the construction of a gate house.

The McGraw Tire & Rubber Company, East Palestine, Ohio, largely owned by Pittsburgh interests, has taken out an Ohio charter and has increased its capital stock from \$100,000 to \$1,000,000, of which \$200,000 in preferred stock will be sold and the proceeds devoted to improving and extending the plants.

The John F. Robertson Company, Park Building, Pittsburgh, manufacturers' agent, has taken the account of the Roto Company, Hartford, Conn., manufacturer of roto-turbine cleaners.

The business of the Diamond Forging & Mfg. Company, North Side, Pittsburgh, manufacturer of automobile, wagon and tool forgings, has increased to such an extent that the company has practically decided to build a new plant. It may possibly locate outside the Pittsburgh district.

The Ideal Tool & Mfg. Company, Beaver Falls, Pa., has been organized to manufacture screw cutting dies and tools. Paul B. Oatman is manager. It is an identified interest of the Union Drawn Steel Company, Fred N. Beegle being president of both companies.

The Hanlon-Gregory Galvanizing Company has been granted a Pennsylvania charter and will operate in the building formerly occupied by the Totten & Hogg Iron & Steel Foundry Company, Pittsburgh. John A. Hanlon, formerly president of the Pittsburgh Galvanizing Company, is general manager.

The Best Mfg. Company, Pittsburgh, works at Oakmont, Pa., has received a large order for piping installation for the new power plant to be built by the New York Edison Company, New York City.

Edgar T. Ward & Sons, 23 and 25 Purchase street, Boston, Mass., announce that Edgar T. Ward, after being engaged in the steel business in Boston for 30 years, retired from active business March 1, withdrawing from the firm. John Ward and Edgar Ward have formed a co-partnership under the name of Edgar T. Ward's Sons and will continue the business as heretofore.

John H. Burns, Jr., who for a number of years has had charge of the purchasing department of Dodge Bros., Detroit, Mich., has severed the connection and associated himself with I. M. Jacobson & Sons, manufacturers of metals and alloys, 408 Ford Building, Detroit, who are now operating their new smelting works located at 70-72 Catherine street, in that city.

The Empire Steel & Iron Company held its annual meeting in New York, February 26. The retiring directors were re-elected. Leonard Peckitt, president, stated that the earnings for the year 1912 had been very satisfactory, particularly in the last six months, and that the company's blast furnaces are now operating at 85 per cent. of capacity.

The Goulds Mfg. Company, Seneca Falls, N. Y., re-elected officers as follows February 24: President, N. J. Gould; vice-presidents, D. V. Colby, W. D. Pomeroy, W. E. Davis and W. E. Dickey; secretary, H. S. Fredenburg; treasurer, B. R. Wells; assistant treasurer, E. W. Medden. The board of directors was not changed.

The Continental Supply Company, Youngstown, Ohio, an identified interest of the Youngstown Sheet & Tube Company, has elected officers as follows: James A. Campbell, chairman of the board; W. E. Manning, president; W. H. Adams, vice-president and treasurer; W. K. Hughes, second vice-president, and W. R. Wilkinson, secretary.

The Union Foundry Company, Fitchburg, Mass., is building a large addition to its main foundry, which will double the present capacity. Contracts for the buildings and the new machinery necessary have all been placed, calling for completion within six weeks. The company makes gray iron and semi-steel castings.

The David Ranken School of Mechanical Trades, at St. Louis, has completed the construction of a \$300,000 addition to its school buildings. This will enable the trebling of the student capacity of the institution, bringing it up to about 450 and relieving the long waiting list which has been in existence some time. Two new courses have been added, namely, applied electricity and machine shop practice. The institution is entirely independent, having been well endowed by the founder, who gave his whole fortune to it, enabling the taking of students at the nominal fee of \$30 per year, which is really only charged to impress the students with the seriousness of its purpose. The school has proved itself practical in its results and has so far had the approval of union labor in its policies, as well as the practicability of its work.

A third workman's compensation bill will be introduced in the New York Assembly, based on the expectation that an amendment to the constitution will be adopted permitting the passage of a compulsory compensation act. The bill will compel accident payments by employers and it will apply to all regular employees except farm laborers and domestics. It excepts persons whose employment is casual and is not in the line of the business of the person for whom the work is done. A State insurance fund is created, but the employer is left free to choose his own mode of insurance, subject to the approval of the State board. The scale of compensation is about 20 per cent. higher than that of the Foley bill, which employers generally support.

The New Castle Steel & Iron Company, organized in Pittsburgh last year, has taken over and is now operating the plant of the New Castle Forge & Bolt Company at New Castle, Pa. Its products are general drop and car forgings, bolts, nuts, chain and rivets and it is adding new equipment which will considerably increase its capacity. The general offices have been removed from New Castle to 616 Farmers' Bank Building, Pittsburgh. P. A. McBride, formerly secretary and treasurer of the old company, is general sales manager of the new one. An office has been opened in room 504, First National Bank Building, Chicago, with T. F. Donahue, former superintendent of the New Castle Forge & Bolt Company, as Western sales manager.

The entire plant of the Knox Pressed & Welded Steel Company at Niles, Ohio, with the exception of the power house, was burned February 26. A new plant will be built at Niles, but on a much larger scale, having at least double the capacity of the one destroyed. The company has made arrangements with the Pennsylvania Engineering Works, New Castle, Pa., to take care of its contracts, and all old orders and new business will be promptly executed. The company will be in the market for a large line of iron working tools for the new plant, but will not be ready to place contracts for some time. Its general offices are in the Farmers' Bank Building, Pittsburgh.

Tests under Government auspices of castings manufactured by the Egan-Rogers Steel & Iron Company, Crum Lynne, Pa., have been showing 70,000 lb. tensile strength, 38,000 lb. elastic limit, 28 to 34 per cent. elongation in 2 in., and 45 to 50 per cent. reduction of area. The production of the company, whose plant was started in August, 1912, to make a specialty of light weight castings, has been increasing steadily.

The annual meeting of stockholders of the Wheeling Steel & Iron Company, was held recently in Wheeling, W. Va. The net profit for the year was given as \$577,829.61. C. S. Hubbard, president of the company, stated that business in the first half of 1912 was unsatisfactory but improved considerably in the second half.

The Chicago Steel Products Company, Chicago, reports the following contracts secured for fabricated structural steel: Holland High School, Holland, Mich., 150 tons; Mt. Carmel Church, Chicago, 150 tons; Milwaukee Western Steel Company, Milwaukee, 250 tons.

Production of Hydrogen and Oxygen at Waverly, N. J.

Some interesting information has been obtained regarding the electrolytic production of hydrogen and oxygen at the plant at Waverly, N. J., of the International Oxygen Company, New York City. The plant comprises 110 so-called generators, and each individual generator takes 400 amperes at 2.2 volts. Each generator, under these conditions, has an oxygen production capacity, it is stated, of 3.5 cu. ft. per kilowatt-hour of electrical energy, and the amount of water to be replenished daily amounts to 1 gal. As the hydrogen is, of course, produced in double the volume of the oxygen, a single generator gives 7 cu. ft. per kilowatt-hour. The 110 generators are installed in two compact double rows, and the units are electrically connected in a multiple series arrangement. In an eight-hour day, the generators will each produce 25 cu. ft. of oxygen and 50 cu. ft. of hydrogen.

Each generator of the new type is 3 ft. 7 in. long over all and 1 ft. 7 in. wide. The container is an iron casting and of approximately these dimensions, horizontally, and of the height of about 2 $\frac{3}{4}$ ft. The upper portion of the side walls is double, thus providing a trough enveloping the upper rim. This makes possible the water sealing of the joint between the cover and the container. The cover has, in fact, a downwardly projecting flange suited to fit into the trough. The hydraulic joint is 8 or 10 in. in height. A second tank filled with large perforations hangs from the cover and is enveloped by the container. The perforated tank becomes the positive electrode when the apparatus is connected up, and the outer tank becomes the negative electrode. The container is filled with an alkaline solution to a depth of about 28 in. On the interior of the outer tank, the hydrogen is formed; while the oxygen is generated on the perforated surfaces of the inner tank. The electrolytic bath contains about 45 gal. of water. In this are dissolved about 155 lb. of caustic potash or about 73 lb. of caustic soda. The chemical is added to the water for the purpose of facilitating the passage of the electric current between the electrodes. If potash is used, the strength of the solution should be approximately 28.9 per cent.; if soda, approximately 15.0 per cent.

In order to prevent mixing of the two gases, a bag of specially prepared asbestos is employed. This bag closely envelops the perforated tank where the oxygen forms. The water employed should be either rain water or distilled water. The purity, it is explained, is over 98.5 per cent. for the oxygen and over 99.5 per cent. for the hydrogen. The cells will start generating within a few seconds after turning on current.

The Baldwin Locomotive Works

The Baldwin Locomotive Works, Philadelphia, has issued its second annual report, covering operations of the fiscal year ended December 31, 1912. The gross sales are reported at \$28,924,335.16, against \$29,342,585.72 in the preceding year. The expenditures for real estate, buildings and machinery for the year were \$799,434.46. The amount charged against operations for maintenance and renewals was \$857,306.19. The net profit for the year was \$3,698,571.44 against \$3,243,490.78 in 1911. The surplus after the payment of dividends was \$1,898,571.44. These figures include dividends received from the Standard Steel Works Company, a subsidiary. The total surplus December 31, 1912, of the Baldwin Locomotive Works and Standard Steel Works Company was \$3,091,706.82.

President Alba B. Johnson states that of the \$5,000,000 Standard Steel Works Company bonds originally issued \$1,000,000 has been canceled by the provisions of the sinking fund, leaving the amount outstanding \$4,000,000. The amount charged against the operations of the year for maintenance and renewals on this company's plant was \$507,250.28. Up to this time nothing has been done on the proposed locomotive plant at East Chicago beyond grading and fencing, but should business conditions promise to be favorable throughout the year 1913 work of construction will be begun. The unfilled orders on the books at the beginning of 1913, Mr. Johnson says, were larger in amount than at any time since the acquisition of the property by the new company and the outlook is favorable for a continuance of the present prosperous conditions.

American Iron and Steel Institute

Testimonial Resolutions to James M. Swank—Newly Elected Members

At the monthly meeting of the directors of the American Iron and Steel Institute, on Friday, February 28, the following resolutions were unanimously adopted:

"Whereas, On December 31, 1912, after 40 years of service, James M. Swank resigned his office of secretary and general manager of the American Iron and Steel Association, and

"Whereas, On January 1, 1913, the work of the American Iron and Steel Association was taken over by the American Iron and Steel Institute, whose members were generally interested in and connected with the American Iron and Steel Association; be it

"Resolved, That the directors of the American Iron and Steel Institute hereby record their profound appreciation of the fidelity and skill with which Mr. Swank discharged the duties of his office during that long and important period, and also their high estimate of his character as a man.

"Resolved, That these resolutions be engrossed in duplicate, one copy to be sent to Mr. Swank and the other to be framed and hung on the wall of the Institute board room."

Isaac M. Scott, Steubenville, Ohio, who recently withdrew from the LaBelle Iron Works to become president of the Wheeling Sheet & Tin Plate Company, has resigned from the board of directors of the American Iron and Steel Institute because he has found it impossible to attend the board meetings as regularly as seems to him proper. At Friday's meeting of the board William H. Donner, president of the Cambria Steel Company, was elected a director to succeed Mr. Scott.

The following persons have been elected to membership in the institute:

- Lawrence L. Arnold, general manager Wickwire Steel Company, Buffalo, N. Y.
- Walter A. Barrows, Jr., metallurgist, Brainerd, Minn.
- J. Orr Callaghan, Steel Company of Canada, Hamilton, Ont., Canada.
- William H. Cameron, manager safety department American Steel Foundries, Chicago.
- Charles L. Cantley, assistant to general manager, Nova Scotia Steel & Coal Company, New Glasgow, N. S.
- William L. Davis, manager Old Meadow Works, American Sheet & Tin Plate Company, Scottdale, Pa.
- Ralph B. Dimmick, chemical engineer and metallurgist, American Rolling Mill Company, Middletown, Ohio.
- Daniel Eppelsheimer, Jr., mechanical engineer, American Rolling Mill Company, Middletown, Ohio.
- Robert H. Irons, general superintendent Central Iron & Steel Company, Harrisburg, Pa.
- Ross H. McMaster, Steel Company of Canada, Montreal, Canada.
- Marvin A. Neeland, assistant to vice-president United States Steel Corporation, New York.
- Frank Samuel, Philadelphia.
- Wm. O'Neill Sherman, chief surgeon Carnegie Steel Company, Pittsburgh.
- Arthur J. Skemp, manager Scottdale Works, American Sheet & Tin Plate Company, Scottdale, Pa.
- Wm. P. Snyder, Jr., assistant to president Shenango Furnace Company, Pittsburgh.
- Frank H. Whitton, Steel Company of Canada, Hamilton, Ont., Canada.
- W. A. Wickwire, secretary Wickwire Steel Company, Buffalo, N. Y.
- Herbert M. Wilson, secretary Shenango Furnace Company, Pittsburgh.

Higher Foundry Wages and Shorter Hours.—The Cleveland Foundry Company, Cleveland, manufacturer of oil stoves and other light gray-iron work, announced last week that beginning March 1 a working week would consist of 48 hours, the distribution being as follows: Nine hours each on the first three days, eight hours each on Thursday and Friday, and five hours on Saturday. Besides reducing hours, the company advanced the wages of its employees, but the amount is not given beyond the newspaper statement that \$75,000 [presumably per year] represents the increased cost. Time and one-half is to be paid for overtime. The company employs 1,000 men. Its employees are not organized. In Cleveland foundries employing only union men, the working day is nine hours, with a half holiday on Saturday in the months

National Enameling & Stamping Company

The National Enameling & Stamping Company has issued its report covering the 18 months ended December 31, 1912. It shows a deficit of \$241,229 after the payment of dividends on the preferred stock. The previous report was for the year ended June 30, 1911. The income account compares as follows:

	18 mo. end. Dec. 31, '12	Year end. June 30, '11
Gross profits, after cost of materials, wages, selling expenses, taxes, insurance, operating expenses, bad debts, etc., but including \$15,980 income from investments.....	\$2,119,968	\$1,740,006
Deductions:		
Salaries of officers.....	\$81,000	\$54,000
Repairs, renewals, etc.....	833,024	351,963
Interest.....	108,041	59,957
Total deductions.....	1,022,065	665,920
Net profits.....	\$1,097,902	\$1,074,085
Interest, sinking fund, etc.....	441,737	304,666
Preferred dividends.....	897,393	598,262
Deficit.....	\$241,229	*\$171,157
Previous surplus.....	1,556,301	1,385,144
Profit and loss surplus.....	\$1,315,072	\$1,556,301

*Surplus.

The balance sheet as of December 31, 1912, compares with the previous year as of June 30, as follows.

Assets.	1912	1911
Investments.....	\$67,465	\$317,472
Real estate, machinery, etc.....	25,721,879	25,289,256
*Discount and expense.....	204,380	223,116
Stock, merchandise and materials on hand..	4,689,740	5,137,010
N. E. & S. Co. of La.....	185,595	175,595
Accounts and bills receivable.....	1,300,477	938,156
Advance payments.....	69,670	95,119
Cash.....	215,038	369,404
Total.....	\$32,454,244	\$32,545,130
Liabilities.		
Preferred stock.....	\$8,546,600	\$8,546,600
Common stock.....	15,591,800	15,591,800
First mortgage bonds.....		250,000
Refunding first mortgage.....	3,159,000	3,278,000
Accrued interest.....	13,163	17,825
Bills and accounts payable.....	1,925,109	1,582,604
Sinking fund reserve.....	403,500	222,000
General reserve account.....	1,500,000	1,500,000
Profit and loss surplus.....	1,315,072	1,556,300
Total.....	\$32,454,244	\$32,545,130

*Discount and expense of issue of refunding first mortgage bonds.

President F. A. W. Kieckhefer says: "The trade from July, 1911, to early in last fall was not normal, but we are pleased to report that in the later months of the year 1912 sales of the company showed marked increases and fair profits and we look forward to a prosperous business in the present year. Following the policy of the past the directors have not allowed the conditions under which they were working to interfere with liberal expenditures on repairs and maintenance; plants have been kept in the highest state of efficiency and the cost whereof has been charged against the earnings."

The New Syracuse Steel Plant

Complete plans for the extensive steel plant to be erected at Syracuse, N. Y., by the Crucible Steel Company of America, have been finished by Joseph Brennan, chief engineer, Oliver Building, Pittsburgh, and bids for construction will be received about March 31. The plant will comprise a melting house, 65 x 700 ft., one story; a rolling mill, to cover about 2½ acres; hammer shop, machine shop, wire mill, boiler house, transformer station, laboratory, carpenter shop, warehouse and office building. General details and specifications will be obtainable from G. M. Black, general superintendent, Oliver Building, Pittsburgh. Contract for the structural steel has already been let to the McClintic-Marshall Construction Company.

Manufacturers of Racine, Wis., have decided to co-operate with the Commercial Club in conducting an exposition of the trades and industries of Racine some time in June. It is the intention to run excursions from outside points and issue a catalogue naming all products of Racine factories, their locations and officers, the booklet to be distributed broadcast just previous to the time of the exhibition. F. L. Norton, president of the Commercial Club, is arranging the details of the exposition.

The American Museum of Safety

At a special meeting of the officers and trustees of the American Museum of Safety, New York, held February 21, the Harriman railroad medals were discussed. Mrs. Harriman's views were set forth by Dr. George F. Kunz of the Museum. They will consist of a gold, a silver and a bronze medal, all bearing the same design. The gold medal will be awarded by the Museum to the railroad in the United States which will have made the greatest progress in safety and accident prevention, first in safeguarding the traveling public and second in preventing accidents among employees. The silver medal will be awarded to an operative head, such as a division superintendent, who has himself accomplished notable work along safety and accident prevention lines. The bronze medal will be awarded to an employee, such as a switchman, a brakeman or a yardman, who has performed some kind of service or in some way contributed to the safety either of the traveling public or of his fellow workmen. The three medals will be awarded annually in January, the first presentation to be in 1914.

The matter of a new and suitable building, such as the museums of safety abroad have, was brought up and a committee consisting of Arthur Williams, James Speyer, Henry D. Whitfield, Dr. George F. Kunz, L. B. Gawtry and Dr. Charles A. Doremus was appointed to consider it. The Museum now rents quarters in the Engineering Societies Building, 29 West Thirty-ninth street, New York, and the space and accommodations are entirely inadequate. A bill is now before the Legislature for the State to provide such a building. Another committee was appointed to arrange for the First International Exposition of Safety and Industrial Hygiene, which will be held in Grand Central Palace, New York, in December of this year. This will include safety, sanitation, hygiene, and accident prevention exhibits from all over the world. The committee consists of Dr. N. E. Ditman, Dr. George F. Kunz, A. R. Shattuck, Judge E. H. Gary and A. A. Anderson.

Allis-Chalmers Personal Property Sold

Representing the Reorganization Committee of the Allis-Chalmers Company, Fred Vogel, Jr., Milwaukee, bid in for \$4,000,000 the personal property at the sale conducted February 27 by receiver Otto H. Falk. This followed the disposal of the real property February 3 to the same committee for \$2,500,000. Objections were interposed on the part of the preferred stockholders in the Bullock Electrical Mfg. Company, Cincinnati, a subsidiary corporation. These stockholders denied claims of the Allis-Chalmers Company, that their accounts more than counterbalanced.

The personal property includes stocks, bonds, mortgages, leases, securities, machinery, etc., at Scranton, Cincinnati, Milwaukee and Chicago. When the court approves of the sale of the personal property a new organization will be formed with a capitalization of \$42,000,000, of which \$27,000,000 will be common stock.

By a supplemental order issued February 24 the Interstate Commerce Commission has further suspended until June 26 the effective date of proposed advances in rates by railroads for the transportation of pig iron from points in upper Michigan and Minnesota to Kansas City, Mo., and other destinations. The commission has granted the application of carriers for authority to establish a rate of \$3.25 per ton of 2240 lb. on muck bars, blooms, billets, slabs, crop ends, ingots, wire rods (in coils), and sheet bars, or bars of steel, carloads, usual minimum weight, from Birmingham, Ala., and group to Wilmington, N. C., for export, without observing the long and short haul provision of the fourth section of the act.

The Union Switch & Signal Company, Pittsburgh, has issued its financial statement for the year ended December 31, 1912, which shows total net income of \$1,146,361.75, and total expenses of \$141,630.61, leaving a net profit to be added to the surplus of \$1,004,731.14. The total surplus at the close of the year was \$1,720,470.59. The company's plants continue to operate at full capacity, and if business keeps up throughout the year at its present rate a new high record in earnings will no doubt be established.

The New Ohio Compensation Law

The new workmen's compensation law in Ohio will go into effect January 1, 1914. The new act, which is known as the Green law, enlarges the scope of the present law which has been in effect about a year. The most important feature of the new law is that it makes it compulsory for all employers of five or more persons either to operate under its provisions by contributing to the State insurance fund, or to provide insurance for their workmen by having benefit funds of their own or by maintaining with others mutual insurance associations. It is left optional with employers of less than five persons whether they insure under the law. Under the present law it is optional with all employers, and only a small percentage have paid into the State insurance fund. The new law prohibits employers from carrying insurance with liability companies.

Employers who carry their own insurance must have sufficient financial ability to render certain the payment of compensation and the State Liability Board of Awards is given general supervision over the employers who thus elect to carry their own insurance and is given authority to require security from such employers to insure the payment of damage claims. When employers carry their own insurance compensation, payments must equal those paid by the State in similar cases. Those who carry their own insurance must pay into the State fund 10 per cent. of the premium that they would be required to pay if they were insured by the State. Another change in the existing law requires employers to pay all the State insurance premiums. The present law provides that the employer shall pay 90 per cent. of the premiums and the employee 10 per cent., but most employers have paid the full amount.

Employers who either come under the law or who have their own insurance fund are exempted from damages at common law or by statute except in cases where injury or death has resulted from the willful act of an employer or his agent or their failure to comply with laws for the protection of employees. In this case the law provides that none of its provisions shall affect the civil liability of such employer, and an injured workman may, at his option, claim compensation under the law or institute suit for damages. If an injured employee applies for an award or accepts compensation from an employer, he waives his right to bring suit. However, if the State board of award denies him an award he still has the right to bring suit in the courts.

For temporary disability the employee will receive two-thirds of his average weekly wages, but not over \$12 or less than \$5 a week as long as the disability continues, and for not to exceed six years, or \$3750 altogether. In case of partial disability, he is to receive two-thirds of the impairment of his earning power during the continuance thereof, but not more than \$12 a week and not to exceed \$3750. For permanent total disability he will receive two-thirds of his average weekly wages, not to exceed \$12 or less than \$5 a week, for life.

The new law provides a schedule of awards for disability for certain specific injuries which, under the present law, are left largely to the judgment of the board of awards. These provide for the payment of two-thirds of his weekly wages, not to exceed \$12, for a specified number of weeks. Among the injuries named and length of time the payments are to be paid are the following: Sixty weeks for loss of thumb; 35 weeks, first finger; 30 weeks, second finger; 20 weeks, third finger; 15 weeks, fourth finger; 150 weeks, hand; 200 weeks, arm; 125 weeks, foot; 175 weeks, leg; 100 weeks, eye. The loss of both hands or arms or both feet or legs or both eyes or any two of these members is to be considered permanent total disability. Provision is made for payment to dependents in case the injury results in death within two years.

As under the present law, insurance rates are fixed for the various industries and provision is made for readjustment every six months should the payment made in a particular industry warrant a raising or lowering of the rate.

The Pittsburgh Plate Glass Company, Pittsburgh, in its annual report for the year ended December 31, 1912, shows net earnings of \$2,158,880, compared with \$1,962,641 reported for 1911. The total surplus at the close of the year was \$5,307,071.55.

A Study of Blast Furnace Conditions

A series of blast furnace tests furnished data for a recent paper in *Stahl und Eisen* by Dr. Norbert Metz, being his dissertation for the doctorate at the University of Berlin. The tests were carried out on a blast furnace using minette ore at the plant of the Eisenhütten-Aktien-Verein Dudelingen (Luxemburg). The furnace has six tuyeres; its height from the base of the hearth to the throat is 55 ft. 8½ in.; the hearth is 9 ft. 2 in. in diameter and the cubical contents are 12,077 cubic feet. The average daily output is 120 to 130 metric tons of basic Bessemer iron, with a coke consumption of 2645 lb. per metric ton (2204.6 lb.). The average blast pressure is 4.82 lb. per sq. in. and the blast temperature varies from 800 to 870 deg. C. (1472 to 1598 F.).

Detailed results are given of analyses of samples of gas and ore taken from the furnace through openings in the furnace wall, at various distances from the throat to near the bottom of the boshes. Several series of samples were taken; some simultaneously from the various openings, others at various times, and still others from the center and edge of the furnace. Temperature measurements were also made.

In his discussion of the results the author speaks first of the separation of carbon, concerning which a great deal has been written. He considers that this carbon separation is not the cause of hanging, as has been suggested, but that it is a result of hanging. When the furnace hangs, the gases penetrate through separate channels, and their velocity is only low through the remaining material, so that carbon separation is greatly favored. The author's general conclusions from the three series of tests are:

1. The decomposition of the calcium carbonate is only brought about in a well marked zone.
2. The separation of carbon is probably not the cause but the result of the furnace hanging.
3. Four distinct zones may be separated for the formation of hydrogen:
 - a. The highest part of the shaft, where the reduction of water by means of carbon-monoxide is the greatest.
 - b. The lowest part of the shaft where a smaller amount of hydrogen is produced.
 - c. The bosh, where the last traces of water introduced with the charge are dissociated.
 - d. The tuyere zone, where water is introduced by the blast or by leaks in the water cooling arrangements.
4. The variations in blast temperature brought about by changing the stoves can be noticed until at least the upper part of the bosh is reached.

G. B. W.

M. A. Hanna & Co.'s Ore Booklet.—M. A. Hanna & Co., Cleveland, have adopted a new method of presenting the analyses of their Lake Superior iron ores in the booklet just issued for the season of 1913. The analyses are presented in tabular form by ranges, so that ready comparison is possible. In the case of the Barrows ore, Cuyuna Range, the expected analysis for 1913 is given; also the expected analysis for magnetic concentrates which are announced as the product of the Canada Iron Mines, Ltd., whose property is in Hastings County, Ontario. The concentrates are coarse and granular and contain a small amount of fines. They run 59 per cent. in iron, 0.02 per cent. phosphorus, 694 per cent. silica and 6.21 per cent. lime, being more than self-fluxing. A feature of the booklet is a series of tables of ore values figured from the base ore prices for 1913. Announcement is made that after April 1, M. A. Hanna & Co. will be located in the Leader-News Building, corner East Sixth street and Superior avenue, Cleveland.

M. G. Condon, for many years connected with H. B. Underwood & Co., Philadelphia, Pa., has purchased the interests of D. W. Pedrick, A. D. Pedrick and H. A. Pedrick in that firm and now has associated with him as partners David Hitchman, Hiram Griffiths and C. O. Ralph, who have been identified with the mechanical department of the business. There will be no change in the name of the firm and it will continue to manufacture its line of portable railroad repair shop tools and conduct a general business of engine and machinery repairing, both at its plant at Eleventh and Hamilton streets or at its customers' plants. The change became effective February 17.

The Machinery Markets

The machinery trade situation is generally good despite the absence of any rush in new business or exceptionally large propositions. The indications are that a better demand will be stirring in the next few weeks unless something unlooked for occurs. The little falling off noted in several cities a week or ten days ago seems to have been shortlived and demand of a steady and varied character has resumed its sway. New York dealers have been fairly busy and some good deals are mentioned. In Philadelphia, February exceeded January and inquiries make the outlook good. New England conditions are encouraging, the dealers are enjoying a satisfactory trade and the shops are busy. The demand for single machine tools continues a feature in Cleveland, although some better inquiries are out. In Cincinnati many scattered orders are being added to those which are keeping the shops busy, some of them day and night. The demand for replacement of shop equipment is good in Detroit. New construction foreruns a good demand for machinery of various kinds in Milwaukee. The Central South is doing better than in previous years at this season. Although there has been some falling off in current demand in Birmingham general conditions are so good that activity cannot soon subside to any considerable degree. Improvement continues to be shown in St. Louis, where inquiries are coming out more freely and optimism prevails. Texas conditions are better than they were a year ago, particularly in the increased demand for irrigating and electrical equipment. The market on the Pacific coast is showing a gradual improvement, though outside work is still curtailed by the weather and dependence is now on the good volume of small orders.

New York

NEW YORK, March 5, 1913.

Statements of New York machinery houses as to the amount of present trade activity are at variance. Dealers whose lines cover a wide line of machinery give pleasing reports, some of them saying that business is better than fair, and in reality good, while a few representatives of manufacturers whose lines are restricted to cranes, forging machines, boring mills, certain types of lathes and some other machines, declare the local market to be slow. Probably the situation can be summed up as fairly good, with inquiries a little fewer in number. The demand for automatic machines which save in the cost of production is good and deliveries for some classes of these machines, particularly of the multiple-spindle type, is still far behind and the makers are running night shifts. The Frankford Arsenal, Philadelphia, Pa., has specifications out and near closing for 26 automatic screw machines. The Sprague Electric Works, Bloomfield, N. J., recently closed for six automatic screw machines and several grinders. Two or three good orders for transmission machinery for delivery in other states have been placed with local dealers. The Pawling & Harnischfeger Company has received a long-pending order for an installation of the monorail-hoist system in the Edgewater, N. J., plant of the Warner Sugar Refining Company. Some big propositions which have long been in process of formation are still awaited by the trade. These include a steel company, railroad and automobile company.

The trade is regarding with interest the coming sale at Buffalo of the entire plant (less real estate) of the E. R. Thomas Motor Car Company, when nearly 6000 lots of automatic and other machine tools, machinery and mechanical equipment will be sold at auction by order of United States Judge Hazel. The sale, which is to be conducted by J. E. Conant & Co., auctioneers, Lowell, Mass., will commence March 17 and continue five or six consecutive days. It will be one of the largest sales of the kind ever held in this country and the receivers, George C. Finley and Adolph Rebadow, have received hundreds of inquiries concerning it. The stock in trade, per the inventory handed the receivers, is valued at \$498,000. In the catalogue prepared for the sale there are 162 pages of illustrated descriptive matter and over 10,000 catalogues have so far been distributed, many to applicants in Canada and Europe. The sale has been well advertised and the probabilities are that it will be characterized by active bidding and quick action. The plant will be open for inspection daily for one week prior to the opening day. Of the equipment to be sold, it is stated that 20 per cent. has been installed within 18 months, 65 per cent. within three years and the remainder within the last five or six years. Inquiries should be directed to J. E. Conant & Co., Lowell, Mass.

The Sweet & Doyle Foundry & Machine Company, Green Island, N. Y., recently mentioned as having acquired the plant of the Federal Signal Company, will soon be in the market for grinding machinery for grinding gray iron pump castings, and other miscellaneous small tools.

The Alberger Pump & Condenser Company, New

York, recently mentioned as planning an extension to its plant at Newburgh, states that the addition is for pattern storage and no machinery equipment will be required.

The Edison Storage Battery Company, Orange, N. J., is pushing forward work on its new factory buildings which will give it much increased manufacturing space. They are to be of reinforced concrete construction and are expected to be completed in the summer.

The Consolidated Car Heater Company, Albany, N. Y., is having plans prepared for a five-story factory building which it will erect on Broadway.

The Municipal Gas Company, Albany, N. Y., Anthony B. Brady, president, is taking figures through its architects, Fuller & Robinson, 95 State street for a factory building 60 x 150 ft., four stories and basement, which it will erect this spring. The estimated cost is \$40,000.

The Troy Nickel Works, Albany, N. Y., has its new factory erected in place of the plant destroyed by fire last summer practically completed. New machinery and equipment, most of which is of a special nature, will be installed at once.

D. J. Renaud & Son, Carthage, N. Y., have their new brass and iron foundry and machine shop building. The building will be equipped with a large traveling crane, a 42-in. lathe and other machinery.

The Alexander Smith & Sons Carpet Company, Yonkers, N. Y., has completed plans for an addition 50 x 200 ft., one story, to its plant on Palisade avenue.

Plans are being completed for the rebuilding of the plant of the Enterprise Foundry Company, Auburn, N. Y., which was recently destroyed by fire.

Bids will soon be received for the construction of a sewage-disposal plant at Palatine Bridge, N. Y., in connection with a new sewer system from plans of Vrooman & Perry, engineers, of Gloversville and Amsterdam, N. Y.

The Board of Trustees of the village of West Winfield, N. Y., is receiving sealed proposals for the construction of a municipal water-works system, including pump house, stand pipe and a large tonnage of 4, 6, 8 and 10-in. pipe.

The foundry machine shop and pattern buildings of the Thomas Hinds foundry at Malone, N. Y., recently destroyed by fire, are to be rebuilt and plans are being prepared.

Acer & Whedon, Medina, N. Y., have been incorporated with \$35,000 capital stock by O. W. and E. W. Acer and Charles W. Whedon, to manufacture sheet-metal goods, etc. A plant is being arranged for.

Plans are being prepared by the Volney Paper Company, Fulton, N. Y., for a power house, 25 x 50 ft., which the company will erect, probably early in the summer.

The Mohawk Gas Company, Schenectady, N. Y., Henry W. Peck, general manager, has plans in preparation for the construction of a gas-generating plant in that city to cost approximately \$350,000.

The Canastota Couch Company, Canastota, N. Y., is planning to erect a new factory building or to secure and equip larger manufacturing quarters to care for its increasing business.

The Thomas Ryan Brewing Company, Syracuse, N. Y., will build and equip an addition, 28 x 70 ft., one story, to its bottling plant on Butternut street.

The F. & H. Metal Mfg. Company, Syracuse, N. Y., has been incorporated with a capital stock of \$25,000. A. and R. Fuerlich and B. G. & M. Harrington are the incorporators. A manufacturing plant is being arranged for.

The Sherwood Shoe Company, Rochester, N. Y., Frank A. Sherwood, president, is having plans prepared for a two-story addition, 50 x 90 ft., to be built in the spring.

The Rochester Excavating Machine Company, Rochester, N. Y., has been incorporated with a capital stock of \$10,000. The directors are J. G. Fogarty and H. C. and J. E. Schroeder.

The Buffalo, Rochester & Pittsburgh Railroad Company is having plans prepared for a five-story warehouse to be erected on Canal, Maple and Litchfield streets, Rochester, at an estimated cost of \$1,000,000. E. F. Robinson, of Rochester, N. Y., is chief engineer.

The Durno Mfg. Company, Rochester, N. Y., has been incorporated with a capital stock of \$100,000 by John H. Durno, John F. Turk and Milton Noyes to manufacture mechanical appliances for automobiles. Plans for a plant are under way.

The Ampere Electric Company, Inc., Lockport, N. Y., has been incorporated with a capital stock of \$25,000 to manufacture and deal in electric supplies for automobiles, etc. T. D. Robinson, C. L. Nicholls, Lockport, N. Y., and E. W. Jones, Buffalo, N. Y., are the incorporators.

The Swett Electric Company, Albion, N. Y., has plans in preparation for the enlargement and improvement of its power plant. P. R. West is manager.

Plans for a sewage and disposal plant for the city of Oswego, N. Y., are being prepared by C. H. Snyder, city engineer. The plant will comprise an Imhoff tank system (two tanks) and trunk and storm sewers.

The plant of the McGarrigle Machine Company, Niagara Falls, N. Y., was damaged by fire February 26 to the extent of \$15,000. The loss being principally on expensive machinery with which the plant was equipped.

The E. & B. Holmes Machinery Company, Buffalo, N. Y., will build a machine shop, 45 x 116 ft., two stories, at its plant at Chicago and Ohio streets, that city.

The Atlas Steel Casting Company, Buffalo, N. Y., is planning two additions to its plant which will about double its capacity.

New England

BOSTON, MASS., March 4, 1913.

The business situation is wholly encouraging in its relation to New England industries and fully as much so in metal lines as in any other. The machinery dealers are having a satisfactory trade. The average of January and February was exceedingly good, and March is starting in with no decrease in orders and with full promise of a continuance of prosperity. The large shops are buying equipment in a way to indicate their confidence in the future and smaller houses are assisting largely in swelling the totals.

The supply trade is very busy. One important supply company reports that its January business was the largest for any month in its history, and February's showing was not far behind. Buyers are widely distributed as to lines of industry; practically every manufacturing plant is contributing its share toward the buying. Their depleted store of supplies and of small tools and other tool-room equipment have been to some extent restored, and purchases as a rule are confined to current needs, which fact is a significant indication of the general condition of business. The demand is not steady; it goes by fits and starts, but the totals are excellent.

The Boston & Maine's list of machinery for the Billerica shops has not been awarded, nor is it expected to be for a month or more. The other railroads are buying but little. The manufacturers of electrical equipment have been good customers for several months, including the several works of the General Electric Company. The textile machinery people, while fairly busy, are going carefully in their purchases, because they share the doubts of the textile manufacturers as to the action of the new administration in regard to the tariff. As a whole, however, the proposed revision is not regarded with any great amount of worry by manufacturers in general.

Several important additions to metal-working plants are known privately, but the owners are not ready to make public announcement of their plans. They will mean large purchases of equipment.

The new firm of Hollander & Johnson has established a shop at 44 Vine street, Worcester, Mass., for the manufacture of dies and tools, and will make a specialty of drop-forge dies. The partners are S. S. Hollander and C. O. Johnson. Both have had wide experience in the work. Mr. Hollander was recently assistant superintendent of the shops of the United Shoe Machinery Company, Beverly, Mass., where he had served for 12 years. The equipment for immediate needs has been purchased.

The Hartford Iron Works, Inc., Hartford, Conn., has been organized under a Connecticut charter to manufacture ornamental iron work. The corporation takes over a going business located at East Hartford, which was established by two of the present incorporators, William A. Clinton and Francis P. Lyons. Edward J. Manning, until recently manager of the Royal Typewriter Company, Hartford, and widely and favorably known in the metal trades, is the third incorporator. The capital will be increased and with it the business. Clarence E. Whitney, head of the Whitney Mfg. Company, is among the stockholders.

The Malleable Iron Fittings Company, Branford, Conn., will erect a one-story building, of brick and steel, which will be used as an annealing room.

Announcement is made that the Dover Machine Works, Dover, N. H., has taken over the business of the National Woodworking Machinery Company, Manchester, N. H., and will remove the equipment to Dover. The National Company was organized two years ago, combining the business of the John A. White Machine Company, Manchester, and Witherby, Rugg & Richardson, Worcester, Mass., which was owned by the Hobbs Mfg. Company, of that city. The new combination will make the Dover Machine Works one of the largest manufacturers of wood-working machinery in the East.

The United States Armory, Springfield, Mass., has been awarded funds with which to purchase four boilers for its power plant. The type will be determined later. This is the first step toward a complete new power equipment, the purpose being to replace the present reciprocating engine with a steam-turbine-generator set.

The Empire Mobile Car Sign Company will move its business from Elmira, N. Y., to Hartford, Conn., where a factory has been secured.

Additions to general manufacturing in New England include a building 70 x 300 ft., four stories, for the Hartford Carpet Corporation, Thompsonville, Conn.; a four-story addition, 32 x 60 ft. for the Winsted Hosiery Company, Winsted, Conn.; office building 35 x 70 ft., two stories, for the Wire Goods Company, Worcester, Mass.; and the remodeling of a factory building at Hartford, Conn., for the Glenwood Company.

The Noyes Machine Company, Portland, Me., announces that it will establish works at St. John, N. B., for the manufacture of propellers and other brass specialties.

Butterfield & Co., Derby Line, Vt., manufacturers of saws, dies and die plates, are making arrangements to erect an additional factory building which will increase its output about 50 per cent. This will require a large amount of machinery not yet specified.

The Connecticut Steel & Iron Company, New Haven, Conn., is making improvements to its plant consisting of the installation of a 75-hp. motor and a 13-in. rolling mill which will be in operation about March 15, making a total of three rolling mills. The company manufactures cold-rolled strip steel.

The Jones & Lamson Machine Company, Springfield, Vt., is enlarging its plant by the erection of a fireproof saw-tooth building, 125 x 400 ft., work on which is well under way.

Philadelphia

PHILADELPHIA, PA., March 4, 1913.

The machinery business in February is generally reported as having been comparatively good; in fact, showing a gain over that taken in January. Activity was more pronounced in the closing weeks of the month. Business was made up largely of single tool and small group orders, no individual large lists having figured in the month's business. The trade is more encouraged with the outlook in the spring, considerable inquiry having developed. There is also about the usual amount of pending business, a fair share of which is expected to close at an early date. Railroad

buying continues light. Expected purchases by the Lehigh Valley Railroad are held up because of labor difficulties. While no important inquiries for power equipment have come out, considerable business is pending. Second-hand machinery is moderately active. The export trade in standard machine tools is dull, but some moderate orders in special machinery and power transmission specialties have been entered. Both steel and iron foundries are actively engaged. A number of steel casting plants have large orders in hand for locomotive castings.

The Philadelphia Equipment Company has been incorporated under the Pennsylvania laws with a capital stock of \$15,000. It will engage in the general foundry and mill supply business, having taken over that of the General Supply & Equipment Company, with office and warehouse at 812 Noble street. The new corporation will manufacture some lines of equipment. It will also act as selling agent in this territory for the Western Tool & Mfg. Company, Springfield, Ohio, manufacturer of small tools for machine shop and foundry use, and the Big Savage Fire Brick Company, Frostburg, Md.

It is currently reported that the Lehigh & New England Railroad has decided to establish its new shops at Bath, Pa., and that the expenditure for erection and equipment will reach \$1,500,000.

Theodore Wells Pietsch, architect and engineer, Baltimore, Md., has plans under way for a manufacturing building, 275 x 350 ft., four stories, of structural steel, brick and concrete, to be erected at Boston and Patuxent street, Baltimore, for the Decorative Tin Company. A separate boiler and engine room 60 x 110 ft., will house four 250 h.p. boilers and necessary machinery. Three plunger type elevators are to be installed.

It is stated in the public press that the Hamburg Boiler Works, Hamburg, Pa., is planning an addition to its plant and that among other equipment it is in the market for a medium size lathe.

Local contractors are estimating on the construction of a one and two-story car house and repair shop 187 x 390 ft. to be built in Atlantic City, N. J., for the Atlantic City & Sea Shore Railroad Company.

William M. Tompkins, 804 Penn Square Building, has been appointed general distributing agent in the Eastern territory for the Laurent-Cherry line of pulley blocks, manufactured by the Laurent-Cherry Company, Trenton, N. J.

Active work has been started on the foundation work for the new Metropolitan Building, to be erected at Broad, Wallace and Fifteenth streets. The building will be nine stories, 100 x 396 ft. It will be used for commercial purposes and will have large elevator and power plant installations.

Notice of an intended corporation to be known as the Reading Transit & Light Company, is made and application for charter under the Pennsylvania laws will be made on March 24. The company will engage in the construction and operation of motors or other machinery for supplying power for passenger railways and the necessary apparatus for applying the same.

It is announced in local papers that the Metropolitan Electric Company, Reading, Pa., has decided to rebuild its plant located along the Schuylkill River, at Keapertal dam. New concrete buildings are to be erected and machinery for a hydroelectric plant installed.

Chicago

CHICAGO, ILL., March 4, 1913.

The Hurley Electric Tool Company, 21 South Clinton street, Chicago, has been incorporated, with a capital stock of \$5,000, to manufacture electrical tools and machinery. The incorporators are Neil C. Hurley, L. R. Brigham and Walter L. Haynie.

W. J. Welter, 1638 Michigan avenue, Chicago, is in the market for a 10-in. engine lathe with a medium length of bed.

The Unique Engine & Mfg. Company, Chicago, has been incorporated, with a capital stock of \$2,500, and will manufacture engines and machinery. The incorporators are H. M. Christenson, Peter Walker and Charles W. Terrio.

The Kieley Steam Specialty Company, Chicago, has been organized, with a capital stock of \$2,500. The company's business will have to do with air, water and automatic regulating appliances and it is represented by Ellis D. Whipp, 155 North Clark street.

The Double Blast Mfg. Company, Waukegan, Ill., manufacturer of plumbers' furnaces, will increase its capital stock from \$6,000 to \$15,000. Plans for a new

plant are under consideration, but no definite action has been taken as yet.

The Hutmacher Ice Company, Quincy, Ill., announces its intention to build a plant for the manufacture of artificial ice to cost \$75,000 and to have a capacity of 100 tons daily.

The city of Aurora, Ill., is taking bids on electrical machinery to be installed in the municipal lighting plant.

The Illinois Sheet Metal Company, Milford, Ill., has been organized to manufacture tanks, troughs and other sheet metal products, with a capital stock of \$15,000.

The Minneapolis, St. Paul & Sault Ste. Marie Railway plans extensions and improvements in its Shoreham shops at Minneapolis the coming spring and summer which will involve an expenditure estimated at \$400,000.

The Northern Iron Works, Canton, Ill., is preparing for an enlargement of its plant to include a blacksmith and machine shop, extensions made necessary by the growth of its business.

Aldrich & Potter, Moline, Ill., have let the contract for the enlargement of their plant and are in the market for a squaring shear and a metal brake.

The Hart-Parr Company, Charles City, Iowa, is contemplating the erection of an additional building to be used as a machine shop.

The Union Pacific Railroad has announced its intention to improve its shops at Cheyenne, Wyo.

The Chicago & Northwestern Railway will build new shops at Clinton, Iowa, to include a machine shop 150 x 350 ft., containing 16 engine pits, and a boiler shop 80 x 300 ft. New equipment, including cranes, will be purchased.

The Rockford Cleaning Works, Rockford, Ill., has incorporated, with \$25,000 capital stock, with A. M. Guenther, N. P. Nelson and Clanche Partridge as stockholders, to equip a mechanical cleaning plant.

The Montgomery Elevator Company, Moline, Ill., has been incorporated, with \$150,000 capital stock, by Alexander E. Montgomery, Walter C. Grant and Joseph F. Green, and will equip an elevator for handling grain.

The Mattoon Broom Corn Harvester Company, Mattoon, Ill., with \$50,000 capital stock, has been incorporated by Daniel F. Sutton, Joel B. McDavid and John W. Sutton to manufacture a patented device for harvesting broom corn.

Cleveland

CLEVELAND, OHIO, March 4, 1913.

Considerable inquiry is coming from various sources for miscellaneous single tools and one Ohio manufacturer has a new inquiry for about 25 tools. Second-hand tools are moving freely. Reports of manufacturers are generally satisfactory. Crane builders are having an excellent business and some are unable to keep up with orders. The demand for industrial cars and locomotives is very good. Conditions in the foundry trade continue very satisfactory.

F. G. Borden, president of the National Sanitary Mfg. Company, Salem, Ohio, maker of porcelain enameled iron sanitary ware, states that \$75,000 of the \$125,000 bond issue recently authorized will be used in the erection of an addition to the company's present plant, the installation of new power plant and new foundry equipment.

A new factory building for a japanning department 15 x 90 ft. will be erected by the Schneider & Trenkamp Division of the American Stove Company, Cleveland, Ohio.

The Harbauer Company, Toledo, Ohio, maker of food products, will build a three-story factory building, 100 x 180 ft.

A new garment factory will be erected on Superior avenue near East Twenty-fifth street, Cleveland, by the Kepplinger-Kelley-Homer Company, formerly the W. E. Homer Company.

The village of Nelsonville, Ohio, has authorized the purchase of a new pump for the waterworks department, the estimated cost of which is \$2,800.

The Ravenna Motor Truck Company, Ravenna, Ohio, has been incorporated with a capital stock of \$200,000 by W. F. Traves, A. W. Knuth, H. Schwartz, L. M. MacKenzie and C. O. Liggett.

The D. & A. Paint Mfg. Company, Toledo, Ohio, has been incorporated with a capital stock of \$30,000 to manufacture railroad and automobile paints. The company will establish a plant at 1632 Spielbusch avenue. H. B. Deming and E. H. Horton are secretary and treasurer.

The Blomquist-Eck Machine & Mfg. Company, Cleveland, has moved from 224 High avenue to larger quarters in the Ajax Building, St. Clair avenue. The company expects to add some additional machinery a little later.

The Machine Parts Company, Elyria, Ohio, has increased its capital stock from \$125,000 to \$200,000.

The main building, power house and blacksmith shop of the Little Giant Brick Works of the Toronto Fire Clay Company, Toronto, Ohio, was burned a few days ago. Considerable machinery was badly damaged or totally ruined.

The Alliance Motor Car Company, Alliance, Ohio, will erect a two-story plant 52 x 160 ft.

The Atlas Car & Mfg. Company, Cleveland, has started work on the erection of its new plant on Ivanhoe road. It expects to be located in its new quarters early in the summer. The company will buy some additional machinery which it will be in the market for in a few weeks.

The Sterling Cork & Seal Company, Toledo, Ohio, is planning the erection of a large new plant at Oakwood avenue and Hawthorne street in that city. It is stated that the plant will include several concrete and steel factory buildings.

The Link-Belt Company has opened a branch office at 1304 Rockefeller Building, Cleveland. P. V. Wheeler, who is in charge, will look after the company's sales in the Ohio territory.

A new cold storage plant will be erected in Tiffin, Ohio, by H. R. Grey and W. T. S. White, of Chicago.

At a special meeting of stockholders of the Bowling Green Motor Car Company an increase of \$100,000 in capital stock was authorized. The additional capital will be used to increase the company's manufacturing facilities.

A new sewage disposal plant will be erected in Kent, Ohio, at an approximate cost of \$131,000. Engineer L. E. Chapin, of Canton, Ohio, has charge of the plant.

Machinery will be required to equip shops for the Lake Erie & Youngstown Railroad to be built between Conneaut and Youngstown, Ohio. The building plans announced include a machine shop and two round houses. The general contract for building the round houses has been awarded to the Caldwell Construction Company, Youngstown, Ohio.

The Skinner Bending Company, Toledo, Ohio, will erect a factory addition to be used for the manufacture of wheelbarrows.

John Webber is planning the rebuilding of his show case plant in Bryan, Ohio. It is stated that it will be a two-story brick structure 50 x 186 ft.

The Acklin Stamping Company, Toledo, Ohio, has recently built a large addition to its plant and other extensions are now being planned. The company has large inquiries for stampings and considers that its present bookings insure a good business up to October.

The Canton Foundry & Machine Company, Canton, Ohio, is planning the construction of additions to its plant which include a foundry, 60 x 180 ft.; machine shop, 60 x 200 ft., and another addition, 40 x 160 ft. The company is arranging to extend its line of products by the manufacture of large presses for sheet metal automobile bodies.

Cincinnati

CINCINNATI, OHIO, March 4, 1913.

Several scattered export orders for machine tools were received last week, and domestic business is also reported to be in a very healthy condition. No large lists of tools are being bought, but there is enough business already on order books and coming in to keep practically all machine tool manufacturers in this vicinity operating to full capacity. At least three local concerns are operating night shifts in some departments. Taking everything into consideration, the outlook in the Central West is much more encouraging than it was last year at this time, in spite of pessimistic political talk indulged in by a few manufacturers.

The Cincinnati Steel Castings Company has had plans prepared for an addition to its plant that will double its capacity. Not all of the necessary equipment has yet been purchased. William Gilbert is president of the company.

The Delco Ignition Company, Dayton, Ohio, has purchased the four-story factory building of the Pinneo & Daniels Wheel Company, Dayton, and will fit it up for the manufacture of automobile specialties. The latter company will move to a new location. Both

companies will probably be in the market for considerable new equipment.

It is rumored that the Cincinnati Milling Machine Company has tentative plans under way for a large addition to its plant in Oakley. No details are yet available.

The Equipment Mfg. Company, West Farmington, Ohio, is a new incorporation with \$40,000 capital stock, to manufacture factory trucks and furniture specialties. R. M. Reynolds and D. H. Gilbert are named among the incorporators.

John Hill, for 15 years president of the Hill & Griffith Company, has resigned and formed the John Hill Company. The new company has leased a building on South street that will be fitted up for the manufacture of foundry supplies of all kinds.

The Globe Chemical Company, Cincinnati, is in the market for a 25-h.p. boiler.

W. C. Swift, Coshocton, Ohio, is organizing a company to build a plant for the manufacture of a newly patented factor time clock.

The Foster Stove Company, Ironton, Ohio, has commenced work on a large addition to its plant, mention of which was made some time ago.

The M. F. Kennan Patent Steam Boiler Company, Cincinnati, has been incorporated with \$25,000 capital stock by Michael F. Kennan and others. Nothing is yet known as to the company's manufacturing plans.

C. W. Handman, business manager, Board of Education, Cincinnati, will open bids March 31 on 200 12 x 12 x 48-in. steel lockers.

The F. M. Rose Springwheel Company, Cincinnati, has been incorporated to manufacture a patented automobile wheel. The new company has a capital stock of \$100,000, but manufacturing plans have not yet been given out. F. M. Rose is president of the company.

Detroit

DETROIT, MICH., March 4, 1913.

While February was a fair month with local machinery dealers, some report that the totals will not reach those of January and the month was characterized by a lack of transactions of magnitude. The past week has seen a trend toward greater activity, with some purchases noted from the automobile industry. There is good demand for single tools for replacement purposes, manufacturers generally tending to keep their equipment modernized and at the point of highest efficiency. Merchants state that the volume of business now under negotiation indicates that March will be a very satisfactory month. In special tools and machinery a good demand is noted. The demand for electrical equipment has strengthened but the market for wood-working equipment remains quiet. A pleasing feature of the industrial situation is the activity of the local shipbuilding companies, both of which have a large amount on hand. An increasing volume of building work is reported by local contractors.

The Wagner Baking Company, Detroit, has purchased the entire block bounded by Grand River avenue, Sixth, Bagge and Brooklyn streets, and will establish a new bagging plant, covering the entire property, plans for which are now being prepared. The mechanical requirements are not available as yet.

The Monarch Motor Car Company, Detroit, has been incorporated with \$30,000 capital stock, to manufacture automobiles. The incorporators are August J. Bloom, Francis J. Priest and Everett S. Wallace. A plant will be established in this city.

The bankrupt King Motor Car, Detroit, has been reorganized with \$200,000 capital stock and the factory is again in full operation. The new officers of the company are J. G. Bayerline, president; Artemas Ward, Jr., vice president, and F. A. Vollbrecht, treasurer.

The Ford Motor Company, Detroit, states that the reports which have been current in the daily press to the effect that the company would erect three new factory buildings at its local plant and build a truck plant at Wyandotte, Mich., are erroneous and that no additions are contemplated at present.

The Fairview Brick Company, Detroit, has been incorporated with a capital stock of \$50,000, to manufacture brick. The new company has acquired a tract of three acres at the foot of St. Jean avenue for its plant and will construct a slip from the Detroit River to serve its property. The incorporators are Herbert K. Oakes and Ralph E. Collins, Cleveland, and Fred S. Hall, Detroit.

The Tilden Saw Company, Detroit, has been incorporated with \$300,000 capital stock to manufacture meat saws and other butchers' supplies. The incorporat-

are James T. Currie, Charles D. Todd and Frederick P. Todd.

The Soivay Process Company, Detroit, manufacturer of alkali products, has taken out a building permit covering the erection of a ten story factory building of steel construction, at the foot of West End avenue, to cost \$200,000.

The Superior Foundries Corporation, Detroit, has been incorporated with \$30,000 capital stock and will engage in the general foundry business.

At a special election February 23 the taxpayers of Ovid, Mich., authorized the donation of a three-story brick factory building to the Fox & Mason Furniture Company, Corunna, Mich. The company will place the plant in operation and use it as a branch plant.

The Farmers Handy Wagon Company, Saginaw, Mich., has changed its name to the McClure Company and increased its capital stock from \$300,000 to \$500,000 in order to meet the increasing demand for its products. Silos are the company's chief product.

The Burden Broom Company, Kalamazoo, Mich., has begun the erection of a two-story addition to its plant.

The structural iron plant of James McGregor, Cheboygan, Mich., will be removed to Pontiac, Mich., where a new factory will be built at once.

The G. W. Manning Broom Company, Grand Rapids, Mich., has been organized by G. W. Manning, W. W. Schantz and Louis T. Herman and will equip a plant for the manufacture of brooms.

The Saugatuck Spray & Nozzle Company, Saugatuck, Mich., will, it is reported, erect a new plant and operate on a more extensive basis.

The sawmill of W. J. Chase, Solon, Mich., was completely destroyed by fire February 15. It has been decided to rebuild the plant.

The Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich., paper manufacturer, has increased its capital stock from \$100,000 to \$250,000.

The Aldrich Mfg. Company, Detroit, has been organized with \$50,000 capital stock to take over the business of Frank Aldrich, manufacturer of low water alarms, garbage receptacles and other specialties. Mr. Aldrich is the principal stockholder.

The Central Iron Works, Grand Rapids, Mich., Henry Brobst, proprietor, whose plant was recently destroyed by fire, has purchased a new site and will build a boiler shop 50x100 ft.

The Lyons Machine Company, Lyons, Mich., has plans prepared for a new plant at Muskegon Heights, Mich., to which location the company will move.

Milwaukee

MILWAUKEE, Wis., March 3, 1913.

Inquiries are being rapidly transformed into orders by machine tool builders in the Milwaukee district, and February business shows up exceedingly well as compared with the corresponding period a year ago. The last week of the month proved to be very satisfactory, some orders which had been hanging fire a considerable time being placed. Most of the business is in single or small lots, but the prospect for new construction by manufacturers throughout the State is most encouraging and there will be several fairly good lists to figure on within 30 or 60 days. Much general construction is planned in the city of Milwaukee and the structural people are already figuring on specifications. The organization of electric light and power companies throughout the territory will mean good requirements in equipment. There will be several important water power developments during the year which will reflect on the heavy machinery sources of Milwaukee.

The Fairbanks-Morse Mfg. Company has purchased an 80-acre tract adjoining its present works at Beloit, Wis., with a view to extending its plant. It is expected that details of the proposed new construction will be announced immediately after the adjourned annual meeting of the corporation, which will be held at the Beloit offices March 26. The annual meeting on February 25 adjourned without electing officers, but the purchase of the property was authorized. The Eclipse works at Beloit forms one of the largest units of the Fairbanks-Morse group, employing 2500 men and covering many acres in buildings and yards. It was reported some time ago, when options on additional acreage were taken, that the extensions would approximate 43 per cent. of the present floor space.

B. V. Piper, Kenosha, Wis., has awarded contracts for the erection of a \$20,000 factory building for the Oppers-Rhenstrom Company recently organized to en-

gage in the manufacture of springs and spring bed machinery. The building will be 44x75 ft., two stories, of brick construction. A. C. Lippert and Anthony Rhenstrom, owners of the new company, were formerly associated with the Frank L. Wells Company, Kenosha.

The Globe Foundry & Machine Company, Sheboygan, Wis., which has just been reorganized following a complete change in ownership, contemplates the erection of new and larger works on the north side at Sheboygan this year. Paul Klumb, chief stockholder, has disposed of his interest to William H. and Jacob F. Hilpertshauser of Sheboygan, and the remaining interest has passed into the hands of Ervin T. Thiel and Arthur Miller. Officers have been elected as follows: President, Jacob Hilpertshauser; vice-president, William Hilpertshauser; secretary, Arthur Miller; treasurer, Ervin Thiel.

The McKenzie Mfg. Company, 1648 Berlin street, La Crosse, Wis., has purchased a site at La Crosse on which to build a new plant. The company has only been manufacturing agricultural implements at La Crosse for a few months, but its present quarters are inadequate.

The Bucyrus Company, South Milwaukee, has orders for two 15-ton steam dipper dredges for the Panama Canal, delivery scheduled for December 1, 1913. This concern has furnished more than 75 per cent. of all the canal dredging and excavating machinery purchased by the United States Government.

The Eden Electric Company, Eden, Fond du Lac, Wis., has been incorporated with a capital stock of \$5,000 and will proceed at once with the erection of a small power station which will furnish current for light and power within the village of Eden. John O'Brien is president and manager.

The County Board of Racine, Wis., awarded the contract for \$8,000 worth of gravel pit and quarry equipment for the municipal pits to the Allis-Chalmers Company, Milwaukee.

The Davies Threshing Machine Company, Oshkosh, Wis., has awarded contracts for the erection of a one-story addition, 65x126 ft. The company's tool requirements have practically all been taken care of.

The Water Works Commission of Fond du Lac, Wis., has awarded the contract for a central air compressor and air lift equipment for six artesian wells to the Ingersoll-Rand Company.

D. C. Prescott of Chicago, formerly of Marinette, Wis., and Menominee, Mich., the twin cities, has organized the Engineering Works, Marinette, to manufacture a line of metal specialties of his own design. A factory has been established in Marinette and is in charge of Theodore F. Disch. The Engineering Works' main offices will be in Chicago.

The Wisconsin Aluminum Foundry Company, Manitowoc, Wis., has increased its capital stock from \$35,000 to \$100,000. The additional issue is to cover the construction of a new plant, and it is said that Racine and Milwaukee are being considered because of unfavorable conditions at Manitowoc. The Wisconsin company grew out of the Wisconsin Brass Foundry Company, Manitowoc, and is owned by Bruno Dalwig, Abraham Schwartz, Daniel Sheehan and Henry Stahl.

The Northwestern Molding Sand Company has been incorporated at Beloit, Wis., with a capital stock of \$75,000 by W. S. Perrigo, H. W. Adams and Charles H. Shaw.

Indianapolis

INDIANAPOLIS, IND., March 4, 1913.

The Indianapolis Light & Heat Company has increased its capital stock from \$1,000,000 to \$2,000,000. The company will double the capacity of its Mill street station and will make other improvements.

The Furnas Office & Bank Furniture Company, Indianapolis, has increased its capital stock from \$24,000 to \$36,000.

The Floatless Carburetor Company, Indianapolis, has been incorporated with \$50,000 capital stock to handle patents for carburetors. The directors are M. M. Mahoney, E. S. Cornell, I. E. Rodgers, George D. Sisson and A. H. Cornell.

The stock has been fully subscribed of the Shoals Mfg. Company, Shoals, Ind., which proposes to establish a furniture factory and an electric light and power plant to employ about 100 men.

The Lawter Tractor Company has bought the buildings of the Newcastle Brass & Iron Bedstead Company, New Castle, Ind., and will install machinery for the manufacture of plows, tractors, etc.

The Modern Make Mfg. Company, Goshen, Ind., has

been organized, with \$40,000 capital stock, to manufacture sad irons. The directors are E. E. Ash, Frank L. Krug and W. V. Brundage.

The Motor Starter Mfg. Company, Indianapolis, has been incorporated with \$40,000 capital stock to manufacture motor starters. The directors are S. M. Brundage, W. J. Sylvester and H. J. Herff.

William H. Lincoln, George H. Lucas, John P. Sohn and Lewis Bowlen are organizing a furniture manufacturing company at Columbus, Ind., to be known as the Orinoco Chair Company. It will have \$50,000 capital stock.

The Martinsville Gas & Electric Company, Martinsville, Ind., has increased its capital stock from \$100,000 to \$125,000.

The Sedgwick Mfg. Company, Richmond, Ind., has been incorporated with \$10,000 capital stock to manufacture the Sedgwick automatic automobile lift. The directors are Richard Sedgwick, J. R. Sedgwick and James M. Judson.

The Madison Light & Railway Company, Madison, Ind., has increased its capital stock \$75,000.

The Crum-Wiley Mfg. Company, Peru, Ind., has been incorporated, with \$30,000 capital stock, to manufacture metal products. The directors are E. L. Crum, Max Kraus, S. A. Shesler, Will H. Brown and J. R. Wooding.

The Gary Heat, Light & Water Company, Gary, Ind., has increased its capital stock from \$100,000 to \$1,250,000.

The Builders' Mill Work Company, Laporte, Ind., has been incorporated, with \$15,000 capital stock, to manufacture mill work and specialties. The directors are Charles O. and Frank A. Larson and G. Edward Gaul.

The Long Vitrified Brick Company, North Judson, Ind., has been incorporated, with \$65,000 capital stock, to operate brick and tile plants. The directors are Glenn D. Peters, John W. Long, John J. Urschel, Orpheus C. Maurer and Bert H. Thompson.

The Western Indiana Oil & Gas Company, Terre Haute, Ind., has been incorporated, with \$300,000 capital stock, to sink and operate oil and gas wells. The directors are Fred W. Lockhart, Will A. Church and M. F. O'Reilly.

The Hoosier Brick & Tile Company, Moore, Ind., has been incorporated, with \$10,000 capital stock, to operate a brick and tile factory. The directors are Martin E. Klingler, Harry C. Bruce and George P. Whan.

The Central South

LOUISVILLE, KY., March 4, 1913.

The machinery trade in this section is starting into the final lap of the first quarter considerably in advance of its position at this time last year. Actual orders have been booked in comfortable volume, while the number of inquiries in hand is declared to be larger than in several years. Buying is being done at a rate which shows that manufacturers are thoroughly confident of general business conditions remaining good. In fact, one of the principal features of the situation in this territory is the entire lack of apprehension as to the effect of the change of administration and the amendment of the tariff. It is generally believed that conditions are sufficiently good to be able to stand the ordinary wear and tear of political activity without any serious consequences.

The Henry Vogt Machine Company, Louisville, reports an unusually heavy spring business on ice machinery. Thirty jobs are now going through the shops, which are operating an hour overtime. The boiler demand is good, both independent installations and those connected with ice factories being made in large numbers. The company regards the situation as extremely favorable.

The James Clark, Jr., Electric Company, Louisville, reports the demand for electrical equipment to be heavy. An unusually large number of inquiries have been received from important industrial concerns, indicating that expansions are in order and that they will be made on a large scale.

E. D. Morton & Co., Louisville machinery dealers, have sold the Falls City Woolen Mills, this city, three Williams regulators and pump governors for installation in connection with a battery of Scotch marine boilers.

P. Jacobson & Co., Louisville furniture manufacturers, suffered a loss of \$40,000 in a fire which partially destroyed their plant at Logan and Kentucky streets. It is probable that the factory will be rebuilt.

Brinton B. Davis, a Louisville architect, has plans and specifications for the heating plant and pumping

station to be installed in connection with a new reservoir for the county poorhouse. The Fiscal Court of Jefferson County, Louisville, will receive bids until March 15.

John Kleinstuber, a Louisville florist, will be in the market shortly for boilers to be installed in his heating plant.

The Peter-Burghard Stone Company, Thirteenth and Maple street, Louisville, is considering the installation of additional machinery in its cut stone plant.

The Speedway Tire Company, Louisville, has purchased a factory building, instead of building one, and so is proceeding sooner than expected with purchases of equipment. The power machinery will be bought this week. Address H. L. Lewman, Realty Building, Louisville.

The C. C. Mengel & Bro. Company, Louisville, mahogany manufacturers, has increased its capital stock from \$1,700,000 to \$3,500,000, and will erect a new and larger sawmill on its property at Fourth and H streets. The new mill will be equipped with a power plant of larger capacity, bandsaws, resaws, edgers, etc. Increased facilities may also be provided for its veneer mill in the form of new saws and other special equipment. The plant will be made the largest mahogany manufacturing mill in the country, it is said. Clarence R. Mengel is president of the company.

The ordinance against excessive smoke is being enforced against industrial plants in Louisville, several concerns having recently been tried in the ordinance court on complaint of the smoke inspector. The situation is favorable to the sale of efficient smoke preventing devices.

J. W. Williams, Hazel, Ky., has been elected president of the Clay and Mineral Producers' & Manufacturers' Association, which has in charge a project for the establishment of a washing plant at Paducah, Ky. The association was recently organized there.

The machine shop of the Consolidation Coal Company at Jenkins, Ky., was destroyed by fire recently. It will be replaced at once. The company recently announced plans for the establishment of a large power plant at Van Lear, Johnson County, Ky., which is to operate several of its coal mines in that section. It is now completing the installation of five units in its Jenkins plant, which has a capacity of 13,000 hp. The offices of the company are in Baltimore, Md.

The Damon Mfg. Company, Bowling Green, Ky., has increased its capital stock from \$2,500 to \$20,000.

The Palmer Hotel Company, Paducah, Ky., has announced plans for the erection of a 10-story steel-frame addition. A new power plant, elevators, etc., will be included in the equipment requirements.

F. A. Clegg & Co., Louisville, have the contract for the installation of a large steam heating plant at Bethel College, Russellville, Ky., and R. L. Brister & Co., of Russellville, have the contract for the installation of a water-works plant for the college.

An engine and dynamo in the power plant of the Lexington, Ky., Laundry exploded recently. They will be replaced. A defect in the armature of the dynamo is given as the cause of the accident.

Nelson Walters, Irvine, Ky., has purchased a half interest in the business of Charles Hagan, who operates a large machine shop at Winchester, Ky., and the style of the firm will be Hagan & Walters.

The Raccoon Coal Company, Hazard, Ky., which is to develop 1200 acres of coal lands in Perry County, will be ready for bids on its electrical equipment in 60 days. Motor-driven rock-drills, motor-driven fans and other special machinery will be installed.

The Mineral Fuel Company, Fairmount, W. Va., has been organized to develop a large acreage of coal lands in Letcher County, Ky., and is planning the expenditure of \$500,000. Mining and power equipment will be installed at once. The company plans an output of 750,000 tons a year. James O. Watson is one of the officers of the company.

The East Tennessee Telephone Company has announced plans for the expenditure of \$300,000 at Paducah, Ky., in electrical equipment and other improvements. Address the local manager at Paducah.

N. G. Hemphill, Clinton, Tenn., is preparing to install an electric light and power plant at Hazard, Ky. It is planned to have it ready for use by May 15.

The Middle West Utilities Company, Chicago, which controls the United Water, Light & Traction Company at Somerset, Ky., has announced that a new power plant will be installed at Somerset. Frank J. Barker and L. E. Holderman represent the company at Somerset and are in charge of the new installation. The plant will be used to operate the street railway system as well as provide light and power service.

O. W. McCowen is preparing to erect a large sawmill at Evansville, Ind. He was formerly connected with Thompson, Thayer & McCowen, of Evansville.

The Merchants' Ice & Cold Storage Company will establish a plant at Porter street and Railroad avenue in Memphis, Tenn. W. W. Johnson is manager.

The Park Woolen Mills, Rossville, Ga., a suburb of Chattanooga, Tenn., is to purchase an extractor and possibly an engine to replace equipment recently damaged by explosion.

The Lookout Boiler & Mfg. Company, Chattanooga, Tenn., has increased its capital stock from \$25,000 to \$50,000, and will probably enlarge the capacity of its plant.

The Sugar Valley Brown Ore Company, Chattanooga, Tenn., is reported to be in the market for power equipment, including an engine, boiler, pump, etc. H. L. Davis is secretary of the concern.

J. M. Bray, Lynnville, Tenn., is planning the erection of corn mill with a capacity of 600 bushels a day. Power and special equipment will be needed.

A \$100,000 motor truck factory is to be located in Chattanooga, Tenn., according to announcement of the Manufacturers' Association of that city, which may be addressed for details.

The Planters' Oil Mill & Gin Company, Kosciusko, Miss., is in the market for a Corliss engine, two motors and other power machinery. Used equipment will be considered.

John Stevens, Charleston, Miss., is considering the establishment of a machine shop and woodworking plant, and will be in the market for machine tools and special woodworking equipment. A gasoline engine will also be purchased.

John Holly, Hesterville, Miss., is reported to be in the market for a 50 hp return tubular boiler.

The Harlan-Morris Mfg. Company, Trenton, Tenn., is planning a large stove mill at Natchez, Miss.

Birmingham

BIRMINGHAM, ALA., March 3, 1913.

Machinery dealers report a slight falling off in the volume of business, but with every indication that the lull is to be short-lived. General conditions in all lines of structural work and factory and mine operation are so good that excellent business is expected for some time to come. Two more hydroelectric operations in Alabama will call for large supplies, while the sawmill trade is a steady taker of equipment. Altogether the spring outlook is as good as the winter has been.

J. S. Purcell, Birmingham, Ala., is president of a concern which proposes to manufacture a patented switch at Gadsden, Ala. The company's capital stock is \$6,000.

Hunter M. Smith, Carbon Hill, Ala., reports that the Jagger Creek Fuel Company will develop 1000 acres of coal land to a daily output of 1000 tons.

The Pulaski Iron Company, Pulaski, Va., which bought mining property from the Central Mining Company for \$150,000, will install extensive equipment for mining ore at Grady mines, Cedartown, Ga.

The Panola Light & Power Company, Conyers, Ga., has applied to the State Railroad Commission for the right to issue \$200,000 of bonds. It is establishing steam and hydroelectric plants.

T. H. Friel, president Birmingham Water, Light & Power Company, says work on the hydroelectric plant on Warrior River near lock 17 will start on April 1.

State Senator Watt T. Brown, of Ragland, Ala., and associates have applied for a franchise in Anniston, Ala. Power will be secured from lock 4 on the Coosa River, where the Ragland Water Power Company, which Mr. Brown heads, has contracted to raise the dam and develop 10,000 hp.

The Solomon-Norcross Company, Atlanta, has been engaged to arrange for the installation of a lighting plant for the Chipley Light & Power Company, Chipley, Fla. A. A. Myers is president.

The Clark's Resilient Tire Filler Company, Thomasville, Ga., has been incorporated, with a capital stock of \$100,000, with privilege to increase to \$200,000. Among the incorporators are J. T. and A. B. Clark and J. E. Golden. It will manufacture tire fillers.

The Atlantic Compress Company, Atlanta, Ga., will rebuild its compress that was burned.

J. F. Lee, cashier Royston Bank, Royston, Ga., heads a movement to establish a cotton mill.

George C. Chambers, of Augusta, Ga., has submitted a proposition to the business men of Vidalia, Ga., looking to the establishment of a roller flour mill.

A franchise has been granted to the Bradentown Light, Heat & Power Company, Bradentown, Fla., to

build a gas plant. W. M. Pollock is the local representative of the Philadelphia capitalists who head the enterprise.

The Dekalb County Civic Service Company, Decatur, Ala., has been incorporated and asks for a franchise to establish a gas plant. Incorporators are Neal G. Gross, of Decatur, and T. Wilson Battin and A. L. Osgood, of Philadelphia.

R. A. Moore will establish a machine shop at Wrightsville, Ga.

The Alabama Products Company, Birmingham, Ala., has been incorporated, with a capital stock of \$200,000. With it is consolidated the Southern Supply & Extract Company and the Nut Products Company. It will expend \$50,000 on the erection of a plant. Dr. Louis Schoelhoefer is president. Others interested are Avery S. Joseph, Theodore H. Rabe and Harry Lehman.

The Straus Boilerine Company, Birmingham, Ala., has been incorporated, with a capital stock of \$25,000. S. D. Straus is president.

Paul P. Locking, J. Marksteon, H. H. Hess, John F. Durham and others of Mobile, Ala., have completed an organization for the manufacture of a patented device for registering street car fares.

The Cahaba Lumber Company, which has bought 3500 acres of timber land at Brent, Ala., will install a mill of 15,000 ft. capacity, construct a three-mile tramway, etc. Thomas Goodall, Cole Building, Nashville, Tenn., is interested.

The city of Hurtsboro, Ala., has voted \$24,000 of water, light and sewer bonds and will build plants.

The North Alabama Coal, Iron & Railroad Company, Gadsden, Ala., will install a 200-ton crusher and other machinery at its Hammond mines, where a coal tippie is also being constructed. It will use electricity to operate the plant.

The Brown Bros. Lumber Company, Calera, Ala., will build an ice plant.

St. Louis

ST. LOUIS, MO., March 3, 1913.

Business in the machine tool market continues to show evidences of improvement and while the activity is not of the sensational order, it is very satisfactory to the dealers who have previously been having somewhat of a dull time. Inquiries are coming in more freely and there is generally a tone of optimism prevalent.

The Rock Island Railroad has announced the intention of constructing a fruit and vegetable storage and auction house at St. Louis equipped with mechanical refrigeration with a capacity of about 750 carloads.

The Linde Laundry Company, with \$15,000 capital stock, has been incorporated at St. Louis with Walter and O. T. Rick and J. H. and R. A. Schmetz as stockholders and will equip a laundry plant at once.

The Blackwell Brick Company, Blackwell, Okla., recently incorporated for \$50,000, has bought the plant of the Blackwell Brick & Tile Company and will improve and operate it.

The Ashdown Light & Power Company, Ashdown, Ark., with \$10,000 capital stock, has been incorporated by H. B. Sanderson, A. D. Dulaney, H. L. Toland, R. B. Bryant is proceeding with the completion of its plant.

The city of Gravette, Ark., has awarded a contract for a \$25,000 electric light plant and water works to A. J. Foster, of Joplin, Mo.

The city of Napoleonville, La., has voted to install an electric light plant and the work will be done under the direction of the mayor.

The Missouri State Legislature is contemplating, through a committee appointed to take charge of the matter the installation of a brick plant to cost about \$50,000 in the state penitentiary to make use of the idle convicts, contract labor having been abolished.

The Glueck Box Company, St. Louis, has leased new quarters, the buildings recently vacated by the Home Comfort Range Company, in order to increase its capacity.

The Office Machinery Company, Kansas City, Mo., has been incorporated with \$25,000 capital stock by W. C. Johnson, Arthur B. Clark and Elmer N. Howell and will equip a plant for the manufacture of office appliances.

The Automatic Filling, Capping & Sealing Machine Company, St. Charles, Ill., has been incorporated with \$25,000 capital stock by Fred J. Mosedale, H. Blanford and G. R. Beverly and will equip a plant to manufacture a patented device.

The Davidson-Joplin Mines Company, Alba, Mo., has been incorporated with \$25,000 capital stock by W. H. and G. Davidson and P. F. Maher and will de-

velop property controlled by the stockholders, installing machinery shortly.

The Bayer Steam Soot Blower Company, St. Louis, Mo., has increased its capital stock from \$4,000 to \$10,000 for the purpose of extending its manufacturing capacity.

A water works plant and electric light system is to be built at Hinton, Okla., at a cost of about \$30,000, under the direction of the Benham Engineering Company, Oklahoma City, Okla.

An electric light plant is to be constructed at Wauwette, Okla., in conjunction with the water works plant already in existence there. The Board of Trustees of the city has charge.

Improvements in the electric light and water works plants at Kenton, Tenn., are to be made at once, to include generator, automatic engine, transformers, etc.

The Prairie Milling Company, Montgomery City, Mo., will build a mill at once with a daily capacity of 75 barrels of flour and 50 barrels of corn meal. Machinery contracts have not been let.

The Alexander Dussell Iron Works, New Orleans, La., has been incorporated with \$100,000 capital stock by Alexander and Julius Dussell and others and will increase the capacity of the plant which has been operated as a partnership. New buildings and machinery will be added.

The Stern Foundry & Machinery Company, New Orleans, La., will build an addition to its plant and add mechanical equipment.

The Vick Oil & Gas Company, Warren, Ark., with \$25,000 capital stock has been incorporated by Fred L. Purcell, H. F. Butler, Carl Hollis and others and will equip and develop property controlled by them.

The Interstate Oil & Gas Company, Bartlesville, Okla., has been incorporated with \$100,000 capital stock by A. H. Gorges, John Melcher and C. S. Whitlow and will equip and operate property controlled by them.

An ice plant is to be built at Homer, La., by N. L. Harmon and associates.

The St. Louis Independent Packing Company, St. Louis, Mo., has completed its plans for the \$150,000 cold storage plant previously reported.

J. H. Vaughn, of Fort Smith, Ark., J. A. Arnold, of Bethlehem, Pa., and others have incorporated the Fort Smith Iron & Steel Company with \$150,000 capital stock and will build a plant at a point in Oklahoma not definitely determined as yet.

R. O. James, of Indianapolis, Ind., will build a sawmill to handle timber on land bought by him in Arkansas, near Arkadelphia.

The Newell Lumber Company, of Oklahoma City, Okla., will equip a sawmill with 80,000 ft. daily capacity at Eunice, La.

A hardwood mill is to be equipped at Jennings, La., by the Mentau Lumber Company, which has been incorporated with a capital stock of \$25,000 by H. D. Hill, D. H. Rupert and J. S. St. Germain.

The plant and business of the Otis Mfg. Company, New Orleans, La., will be increased through new capital to be obtained from an increase of the capital stock from \$200,000 to \$700,000.

The Arcola Hardwood Lumber Company, Arcola, Mo., with \$10,000 capital stock, has been incorporated by C. D. Hendrickson and others and will equip a hardwood mill shortly.

A grain elevator is planned to be erected at Lake Charles, La., by Jesse, Miller & Co., Beaumont, Tex.

The Board of Public Works of Kansas City, Mo., has decided to build under its own direction the \$50,000 refuse disposal plant recently reported. Bids will be opened for the machinery on March 11.

A. N. Bengier, C. L. Elliott and E. S. Sloan have incorporated the Farmers' Elevator Company, Fargo, Okla., and will build and equip an elevator in the spring.

The National Syrup Mfg. Company, New Orleans, La., with \$250,000 capital stock has been incorporated by Cicero A. Ramsey, Paul Freund, John E. King, C. A. Wallbillich and others and will equip a large syrup manufacturing plant at once.

Ed Bulliard and others associated with him at St. Martinville, La., have plans for the equipment of a plant there for the manufacture of wagon material. They are in the market for machinery.

The Palace Auto Company, Webb City, Mo., with \$24,000 capital stock, has been incorporated and will equip a repair plant for motor cars with garaging facilities.

The White River Telephone Company, Newark, Ark., with \$20,000 capital stock, has been incorporated by T. J. Raney, T. J. Gates and M. J. Manning and will equip an exchange and rural service at once.

Texas

AUSTIN, TEXAS, March 1, 1913.

Machinery and tool trade conditions in Texas and the Southwest are reported to be much better than they were at this time a year ago. The demand for irrigation machinery and electrical equipment shows an enormous increase. This is particularly true of pumping plants. In southern Texas where waters of the different rivers are being utilized for irrigation many pumps of large capacity are being installed. In the shallow water belts of western Texas the pumps are of smaller capacity but more of them are required than in cases where the old method of irrigating from the rivers is practiced. Corn planting is well advanced in southern Texas and crop prospects all over the state could hardly be brighter. There is noted an increased industrial activity in Mexico and with the complete restoration of tranquillity in that country it is expected there will take place a very large demand for American machinery.

The taxpayers of Rockdale have voted to issue \$30,000 of bonds for the purpose of installing a waterworks plant and constructing a distributing system there.

The National Granometer Company, Dayton, Ohio, is preparing to move its plant for manufacturing granometers, a device for measuring grain, to Orange, Texas. The company has a capital stock of \$200,000.

The Angleton Cotton Gin & Power Company will install additional equipment in its electric light plant at Angleton, Texas, and will establish an ice factory of about 10-ton daily capacity.

The Humble Iron Works, Humble, has been organized for the purpose of installing a machine shop. H. S. Cameron is president and manager.

F. W. Martin will install machinery at his marble cutting yard at Brenham.

The taxpayers of Harris County have voted favorably on the proposition of issuing \$1,000,000 of bonds for the construction of good roads and the building of bridges.

The Southern Traction Company, Dallas, has placed orders for 42 cars for its new line between Dallas and Waco, as follows: Bodies for 22 interurban cars and 3 city cars, St. Louis Car Company; bodies for 10 trailers and 2 work cars, American Car Company, St. Louis; trucks for 42 interurban and 3 city cars, J. G. Brill Company. The company placed an order for the motor equipment for these cars several weeks ago. All will be of semi-steel construction.

The New Century Milling Company has acquired a site for its proposed new milling plant which will be erected at Dallas.

The Tiago Oil & Gas Company, Fort Worth, has been organized for the purpose of operating in the North Texas oil fields. The incorporators are J. S. Morris, G. Blake and C. K. Bullard.

The Southwestern Iron & Wire Works, El Paso, has been organized. The incorporators are J. A. Shedd, Fred B. Moore and Milton T. Shedd.

D. D. Dodd, secretary of the Young Men's Business Club, is promoting the establishment of a canning factory at Marshall.

The Aspermont Water Company is preparing to install a waterworks plant and construct a distributing system at Aspermont. It has let the contract to J. T. Bond for building a water storage reservoir to have a capacity of 100,000,000 gal.

The Texas-Oklahoma Oil Company, Houston, has been organized for the purpose of operating in the Gulf coast oil fields of Texas.

The Coughran Gin & Mill Company, Coughran, which has just been organized, will install a cotton gin. The incorporators are J. W. Wiseman, W. A. Coughran and H. G. Martin.

The Alto Gin & Crate Company, Alto, has been organized for the purpose of installing a cotton gin and a crate manufacturing plant. The incorporators are Samuel G. Goodson, Wade Neeley and G. W. Hughes.

John Murchison, of Athens, will erect a cotton compress at Kaufman. He plans to have the building finished and ready for operation by the opening of the next cotton season.

The taxpayers of Spur have voted favorably on the proposition of issuing \$25,000 of bonds for the installation of a waterworks plant and the construction of a distributing system.

The Jacksonville Lumber Company will enlarge its planing mill at Jacksonville. J. H. Staton is interested. The City Commission of Fort Worth has called an

election of taxpayers for April 8 to vote on the proposition of issuing \$300,000 of waterworks bonds.

The Farmers' Gin Company will install a cotton gin at Moody. The incorporators are W. H. McCurdy, D. C. Jones and Sam Combs.

The Atascosa Valley Irrigation Company will sink artesian wells and develop a large tract of land near Comgran by means of irrigation.

The City Commission of Dallas has ordered an election of taxpayers to be held April 1 to vote on the proposition of issuing \$400,000 for a municipal lighting plant, \$250,000 for the erection of public school buildings and \$500,000 for parks and playgrounds.

The taxpayers of New Boston have voted to issue \$15,000 of bonds for the installation of a waterworks plant.

The Pacific Coast

PORTLAND, ORE., February 25, 1913.

The general machinery market shows gradual improvement, though outside work is still somewhat curtailed by weather conditions. Machine tool business continues on about the same scale as for the last month, orders being individually small but satisfactory in the aggregate. With the opening of the Alaska season the mining machinery department is receiving more attention, though this business is handled largely through Seattle. The steamer Curacao, which left that port recently for Skagway, took the first lot of mining machinery for the season for the interior of Alaska, the shipment being for the Iditarod district. B. L. Thane, in charge of the Alaska Gastineau Mining Company's works, left Juneau recently for San Francisco and New York, expecting to place good orders for machinery and material. A number of large new projects are said to be under way at Juneau, for which inquiries should soon be out. There has been some inquiry from Alaska for gold dredging outfits, but as far as is known the business is hardly as large as last year.

New logging development has not yet started on a very large scale, but dealers in logging equipment report considerable activity in general supplies, and look for a marked increase in the next three months, as conditions in the lumber market are favorable to increased operations. Shipbuilding plants are keeping well occupied. There is some activity in electric and water power development in the interior, and frequent inquiries are received for miscellaneous factory outfits.

P. R. Duchemin, of the Automatic Drill Attachment Company, recently organized with a capital stock of \$100,000, has gone east to order special equipment for a plant to be established at Colfax, Wash.

An engineer's report has just been submitted on the project of the city of Portland to establish a municipal lighting plant, with a power site on the Clackamas River, showing an estimated cost of about \$2,500,000.

The Puget Sound Navy Yard has submitted estimates on extensive repairs, including two new boilers, for the cable ship Burnside.

J. R. Burch, Fletcher Linn, A. D. Nicholson and others are working on a project to build a cement mill between Medford and Gold Hill, Ore.

The City Commissioners of Spokane, Wash., have recommended new carpenter and blacksmith shops, etc., and an addition to the municipal asphalt plant, the latter to cost about \$7,500.

The District Forester, Seattle, Wash., has taken figures on a number of 12 hp. marine gas engines.

Guthrie & McDougall, railroad contractors, have purchased a site in Vancouver, Wash., for a machine shop, warehouse, etc.

The Jamison Shingle Company has secured a site at Everett, Wash., on which it proposes to build a large shingle and woodworking plant in the spring. It is reported that it will install 16 upright shingle machines.

It is reported that the Starr Lumber Company will shortly build a large mill on the Umpqua River, Ore.

A large shipment of machinery for the new C. A. Smith pulp mill on Coos Bay arrived at that place recently on the new steamer Adeline Smith, direct from Newport News. The vessel also brought a heavy tonnage of rails for the C. A. Smith Lumber Company.

The city of Tacoma, Wash., has decided to delay the contemplated purchase of additional equipment for the municipal power plant substation.

The West Coast Iron Company, recently organized at Cleveland, Ohio, has taken a lease on the block bounded by Fifteenth, Sixteenth, Rhode Island and DeHaro streets, San Francisco, where it proposes to erect a plant for the manufacture of iron and steel products.

Eastern Canada

TORONTO, ONT., March 1, 1913.

The Motor Show which has been held this week in Toronto is an illustration of manufacturing development in this country, or rather in the Province of Ontario. When the first auto show was held in the St. Lawrence market eight years ago there was scarcely a town outside of Toronto that had an automobile industry of any sort, either for the manufacture of cars or accessories. Now there are large manufacturing in Brantford, Orillia, Brockville, Oshawa, Windsor, St. Catharines, Berlin, Amherstburg, Petrolia, London, Ottawa, Bowmanville, Ingersoll, Guelph, Galt, Walkerville and Kingston. Toronto and West Toronto have several large plants making engines, batteries, bodies and other parts.

The Canadian Flax Mills, Ltd., capitalized at \$1,000,000, has decided to locate in Guelph, Ont., with a plant to be built at the commencement to cost \$100,000, and to employ 75 hands. It is expected that the factory will be in operation by midsummer. The company has mills also at Drayton, Seaforth and other Ontario points. Its Guelph buildings will be near those of the Dominion Linen Mfg. Company.

The Mueller Brass Works Company, whose buildings are being erected at Sarnia, Ont., has a site of 75 acres. The output of the plant for the first year is estimated at \$150,000. The employees are to be 150 in number. The lines manufactured at Decatur by the Muellers will be duplicated at Sarnia. The general manager of the new plant is Oscar B. Mueller, who also has charge of the United States business of the company in the East and will continue in charge of the New York office. The practical supervision of the plant will be intrusted to Carl G. Heiby, who comes from Decatur, where he has been foreman of the tool-making department. F. L. Riggan will be the secretary, and the foundry foreman at Sarnia will be Richard Lan. The shipping and stock department will be in charge of C. W. Padgett, who goes to Sarnia from the company's New York office. P. W. Blair will have charge of the brass finishing department, and G. P. Harry, of the advertising department at Decatur, will be transferred to the sales department at Sarnia.

Among the companies incorporated under Ontario laws this week are the following: Empire Marble Company, Ltd., Toronto, capital stock \$1,000,000; Duford, Ltd., Ottawa, capital stock \$150,000; Credit Forks Tile & Brick Company, Ltd., Toronto, capital stock \$100,000; The Page LeBoeuf Company, Ltd., Sandwich West, capital stock \$100,000.

The negotiations which have been in progress for some time for the amalgamation of the Dominion Steel Castings Company, Ltd., and the Hamilton Malleable Iron Company, Ltd., both of Hamilton, it is expected, will be closed in the near future. It is said a holding company will be formed with a capital of \$3,000,000, and that the merger will employ between 500 and 700 people.

A by-law to aid the B. F. Goodrich Company, of Akron, Ohio, to the extent of \$24,000 for land site and exemption from taxation on all above an assessment of \$10,000 for ten years was carried by the ratepayers of St. Catharines, Ont., on February 25. Another by-law to encourage the erection of a jam factory by W. H. Brigger, of Hamilton, was endorsed. The latter will receive a fixed assessment of \$5,000 and a free site costing the city \$3,500. The Goodrich Company, it is expected, will give employment to 1000 men within two years.

So great has its Canadian business become that Wm. A. Rogers, Ltd., will have to erect a silverware factory here. All the rights, trademarks and goodwill will be transferred to a purely Canadian company and a special meeting of shareholders will be held shortly to consider the plans which the directors have matured. At present all the silverware which this company sells in Canada is manufactured in the United States, but the American market has grown so large lately that the factories there were unable to attend fully to Canadian orders.

After being on strike a week 100 employees of the International Marine Signal Company, Ottawa, signed terms of settlement and returned to work.

The Collingwood Shipbuilding Company's plant, Collingwood, Ont., has contracts booked that will keep its 1000 employees busy for almost the whole of the next twelvemonth.

The Gartshore-Thomson Pipe Company, Hamilton, Ont., got the city contract for iron pipes, although two other tenders were slightly lower.

The Tyee Shale Products Company, Ltd., Victoria, B. C., has been incorporated with a capital stock of \$100,000, all of which is controlled by local business men. It is the first shale-brick plant organized in the province. The property of the company is located at Tyee Siding, near Duncan, B. C., where there is a large deposit of clean shale. A plant with a capacity of 90,000 bricks per day is to be erected at a cost of \$37,000, and open stove kilns will be used for the first 12 months. Later it is proposed to add three up or down draft kilns, which will cost between \$12,000 and \$18,000. The construction of the plant is to be proceeded with immediately. The company was promoted by J. G. Johnson, one of the directors in the Queen Charlotte Collieries.

Within the near future a powder factory will be constructed in the vicinity of Nelson, B. C., if the plans of D. H. Farris, president of the Jexite Powder Company of Spokane, who is in Nelson looking for a suitable site, are carried to success. Mr. Farris stated that he was acting for the owner of the Canadian rights to the patents under which Jexite powder is manufactured.

Calling for the expenditure of \$22,000 a contract was let a few days ago for the erection of the first unit of the big plant of the Dominion Safe Company, located just across the Lulu Island bridge in Richmond, B. C., near Ebwine. This concern has a manufacturing site covering 10 acres on the waterfront and the B. C. Electric Railway, and proposes to expend \$10,000 in erecting and equipping its plant for the manufacture of safes and locks.

The City Council of Prince Albert, Sask., has decided to submit to the ratepayers by-laws authorizing the sale of 60 acres of the municipality's lands to Felix Frank, manager of the Great West Iron, Wood & Chemical Works, Ltd., of that city. Mr. Frank wants 30 acres of the land as site for a furniture factory and 30 acres for extending his company's present works by more than 100 per cent.

The Red Cliff Pressed Brick Company, Red Cliff, Alberta, is officered as follows: James Hargrave, president; James Mitchell, vice-president, and Hubert Sissons, manager, all of Medicine Hat. The plant is to cover about four acres.

Work on the machine and repair shops of the Canadian Northern Railway Company at Port Huron, B. C., is about to begin.

Government Purchases

WASHINGTON, D. C., March 3, 1913.

The Isthmian Canal Commission, Washington, will open bids March 26, under circular 764, for furnishing three 60, two 25 and two 20 ton electric traveling cranes.

The Bureau of Yards and Docks, Navy Department, Washington, will open bids March 22 for a three-wire, direct-current, engine-driven 125-kw. generator set to be delivered at Norfolk, Va. The amount available is \$5,200.

The Bureau of Yards and Docks, Navy Department, Washington, will open bids April 12 for eleven 15-ton locomotive cranes, with grab-bucket equipment, to be delivered and erected at the naval station, Pearl Harbor, Hawaii, and the Puget Sound Navy Yard, Wash.

The Treasury Department, office of the supervising architect, Washington, will open bids March 18 for one hydraulic mail lift and pumping plant for the United States post office, Augusta, Me.

The Paymaster-General, Navy Department, Washington, will open bids March 11, under schedule 5203, for one 25-hp. motor, two motors and two starting or controlling panels and to vertical simplex feed pumps.

The Bureau of Supplies and Accounts, Navy Department, opened bids February 25 for material and supplies for the navy yards as follows:

Schedule 5157, one patternmakers' lathe—Bidder 60, Hill, Clarke & Co., Inc., Boston, Mass., \$350; 7, Bergen Point Iron Works, Bayonne, N. J., \$362 and \$392; 102, Manning, Maxwell & Moore, New York, \$470; 115, Oliver Machinery Company, New York, \$835; 184, Prentiss Tool & Supply Company, New York, \$362.30.

Schedule 5158, class 32, one geared head engine lathe—Bidder 45, Fairbanks Company, Washington, \$873, \$887, \$896 and \$910; 77, Kemp Machinery Company, Baltimore, Md., \$948.70 and \$967; 102, Manning, Maxwell & Moore, New York, \$998; 110, Niles-Bement-Pond Company, New York, \$1,063; 112, D. Nast Machinery Company, Philadelphia, Pa., \$920; 149, Spaulding & Metcalf, Philadelphia, Pa., informal; 154, W. E. Shipley Machinery Company, Philadelphia, Pa., \$1,048.

Class 33, one upright milling machine—Bidder 45, Fairbanks Company, Washington, D. C., \$366; 76, Kern Machine Tool Company, Hamilton, Ohio, \$295.45; 77, Kemp Machinery Company, Baltimore, Md., \$327.95 and \$279.50; 102, Manning, Maxwell & Moore, New York, \$317.70; 110, Niles-Bement-Pond Company, New York, \$240; 112, D. Nast Machinery Company, Philadelphia, Pa., \$237; 154, W. E. Shipley Machinery Company, Philadelphia, Pa., \$398.

Class 34 one friction-driven shaping machine—Bidder 45, Fairbanks Company, Washington, \$818; 77, Kemp Machinery Company, Baltimore, Md., \$914.50; 102, Manning, Maxwell & Moore, New York, \$799; 110, Niles-Bement-Pond Company, New York, \$930; 112, D. Nast Machinery Company, Philadelphia, Pa., \$692 and \$712; 149, Spaulding & Metcalf, Philadelphia, Pa., informal; 154, W. E. Shipley Machinery Company, Philadelphia, Pa., \$900; 163, Frank Toomey, Inc., Philadelphia, Pa., \$723.50.

Class 35, one power hack saw—Bidder 45, Fairbanks Company, Washington, \$143; 49, Fiske Refining Company, New York, \$124; 77, Kemp Machinery Company, Baltimore, Md., \$116.50; 102, Manning, Maxwell & Moore, New York, \$799; 112, D. Nast Machinery Company, \$102; 131, W. Robertson Machine & Foundry Company, Buffalo, N. Y., \$146.50.

Class 36, one combined wet and dry grinding and buffing machine—Bidder 17, Bridgeport Safety Emery Wheel Company, Bridgeport, Conn., informal; 28, James Clark, Jr., Electric Company, Louisville, Ky., \$220; 45, Fairbanks Company, Washington, \$210; 77, Kemp Machinery Company, Baltimore, Md., \$179; 102, Manning, Maxwell & Moore, New York, \$221; 112, D. Nast Machinery Company, Philadelphia, Pa., \$212; 149, Spaulding & Metcalf, Philadelphia, Pa., informal.

Class 41, three 5-kw. motor generators, 500-cycle quenched-gap radio sets—Bidder 59, Hammond & Lowenstein, New York, \$5,600 and \$5,400; 75, Kilbourne & Clarke Mfg. Company, Seattle, Wash., \$4,900; 98, Marconi Wireless Telegraph Company of America, New York, \$3,500 and \$4,998; 109, National Electric Signaling Company, Pittsburgh, Pa., \$10,750; 141, E. J. Simon, New York, \$9,600 and \$7,500; 158, Telefunken Wireless Telegraph Company of the United States, New York, \$6,235 and \$6,585; 179, Wireless Specialty Apparatus Company, New York, \$6,750.

Class 42, five 2-kw. motor generators, 500-cycle quenched-gap radio sets—Bidder 43, C. & C. Electric & Mfg. Company, Garwood, N. J., \$7,962; 59, Hammond & Lowenstein, New York, \$3,700 and \$3,500; 75, Kilbourne & Clarke Mfg. Company, Seattle, Wash., \$4,040; 98, Marconi Wireless Telegraph Company of America, New York, \$2,400 and \$3,998; 109, National Electric Signaling Company, Pittsburgh, Pa., \$8,000; 141, E. J. Simon, New York, \$4,950 and \$7,500; 158, Telefunken Wireless Telegraph Company of the United States, New York, \$3,900 and \$4,250; 179, Wireless Specialty Company, New York, \$4,475.

Schedule 5,160, class 43, one electric welding apparatus—Bidder 113, National Contracting Company, New York, \$2,850; 136, Rumsey Electric Company, Philadelphia, Pa., \$1,010; 139, Seamund-Wenzel Electric Welding Company, Washington, D. C., \$4,000; 172, Westinghouse Electric & Mfg. Company, Washington, D. C., units; 182, C. Henry Forsland, San Francisco, Cal., \$700.

Class 5,161, one steam-driven air compressor—Bidder 9, Blake & Knowles Steam Pump Works, New York, \$1,858; 12, Bury Compressor Company, Erie, Pa., \$1,966; 15, F. A. Branda & Co., New York, \$2,101; 20, Chicago Pneumatic Tool Company, New York, \$1,845; 69, Ingersoll-Rand Company, New York, \$2,033 and \$2,121; 77, Kemp Machinery Company, Baltimore, Md., \$1,703; 184, Prentiss Tool & Supply Company, New York, \$2,420.15; 186, Hall Steam Pump Works, Pittsburgh, Pa., \$1,995.

Class 45, one 150-ton Marine type high-speed steam hydraulic forging press—Bidder 10, Bethlehem Steel Company, South Bethlehem, Pa., \$4,600; 30, Camden Iron Works, Camden, N. J., \$5,000; 102, Manning, Maxwell & Moore, New York, \$5,133; 166, United Engineering & Foundry Company, Pittsburgh, Pa., \$4,715 and \$3,800.

Class 46, one hydraulic pipe-bending press—Bidder 30, Camden Iron Works, Camden, N. J., \$655; 77, Kemp Machinery Company, Baltimore, Md., \$910; 171, William A. Wood, Media, Pa., \$1,335.

Class 47, one single-acting triplex hydraulic pump—Bidder 5, Allentown Rolling Mills, Allentown, Pa., \$1,900 and \$1,550 alternate; 9, Blake & Knowles Steam Pump Works, New York, \$1,545; 10, Bethlehem Steel Company, South Bethlehem, Pa., \$1,820; 15, F. A. Branda & Co., New York, \$1,226; 36, Dean Brothers Steam Pump Works, Indianapolis, Ind., \$975; 41, Charles F. Elms Engine Works, Chicago, Ill., \$1,150; 77, Kemp Machinery Company, Baltimore, Md., \$2,398; 102, Manning, Maxwell & Moore, New York, \$2,255; 108, National Electrical Supply Company, Washington, D. C., \$1,139; 130, Rumsey & Co., Seneca Falls, N. Y., \$1,261; 171, William A. Wood, Media, Pa., \$1,800.

Class 48 one cupola furnace—Bidder 77, Kemp Machinery Company, Baltimore, Md., \$644.18; 102, Manning, Maxwell & Moore, New York, \$736; 113, National Contracting Company, New York, \$740; 126, J. W. Paxson & Co., Philadelphia, Pa., \$853; 175, E. J. Woodson & Co., Detroit, Mich., \$446.05; 177, Wonham Sanger & Bates, Inc., New York, \$792.50; 181, Rawles-Cobb Company, Boston, Mass., \$708.85.

Class 49, six oil-burning crucible furnaces—Bidder 88, Monarch Engineering & Mfg. Company, Baltimore, Md., units; 102, Manning, Maxwell & Moore, New York, \$2,552; 105, Mirco Fuel Oil Equipment Company, Norfolk, Va., \$3,977; \$4,187, alternate, and \$3,190; 137, W. S. Rockwell Company, New York, \$4,265; 177, Wonham, Sanger & Bates, Inc., New York, \$1,270.

Class 50, one motor-driven rotary foundry blower—Bidder 77, Kemp Machinery Company, Baltimore, Md., \$1,237; 102, Manning, Maxwell & Moore, New York, \$1,026 and \$1,204; 132, F. H. & F. M. Roots Company, New York, \$1,097; 144, B. F. Sturtevant Company, Hyde Park, Mass., \$758; 177, Wonham, Sanger & Bates, New York, \$617.

Class 52, one motor-driven buffing lathe—Bidder 77, Kemp Machinery Company, Baltimore, Md., \$2,117.68; 17, Bridgeport Safety Emery Wheel Company, Bridgeport, Conn., informal.

Class 53, one motor-driven, two-wheel emery bench grinder—Bidder 17, Bridgeport Safety Emery Wheel Company, Bridgeport, Conn., informal; 24, Cincinnati Electric Tool Company, Cincinnati, Ohio, \$54; 28, James Clark, Jr., Electric Company, Louisville, Ky., \$65.90; 62, Hisey-Wolf Machine Company, Cincinnati, Ohio, \$60; 11, Kemp Machinery Company, Baltimore, Md., \$81.60; 170, United States Electrical Tool Company, New York, \$75; 177, Wonham, Sanger & Bates, Inc., New York, \$230; 184, Prentiss Tool & Supply Company, \$72.50.

Class 54, one cornice brake and folder and one tinsmith's large incased turning machine—Bidder 77, Kemp Machinery Company, Baltimore, Md., \$121.50; 102, Manning, Maxwell & Moore, New York, \$126.60.

Class 55, one hand-operated punch, shear and rod cutter, two hand-operated bench punch, shear and rod cutters and one deep-throat hand punch—Bidder 77, Kemp Machinery Company, Baltimore, Md., \$267.87; 167, Union Mfg. Company, New Britain, Conn., \$190.26; 184, Prentiss Tool & Supply Company, New York, \$298.95.

Class 56, five hand-operated threading devices and three hand pipe-cutting devices—Bidder 21, Crane Company, Washington, D. C., \$285.73; 161, Toledo Pipe Threading Machine Company, Toledo, Ohio, \$251.26.

Class 57, ten portable air-driven pneumatic-piston drills—Bidder 20, Chicago Pneumatic Tool Company, New York, \$627; 68, Independent Pneumatic Tool Company, Chicago, Ill., \$1,125; 69, Ingersoll-Rand Company, New York, \$783.48.

